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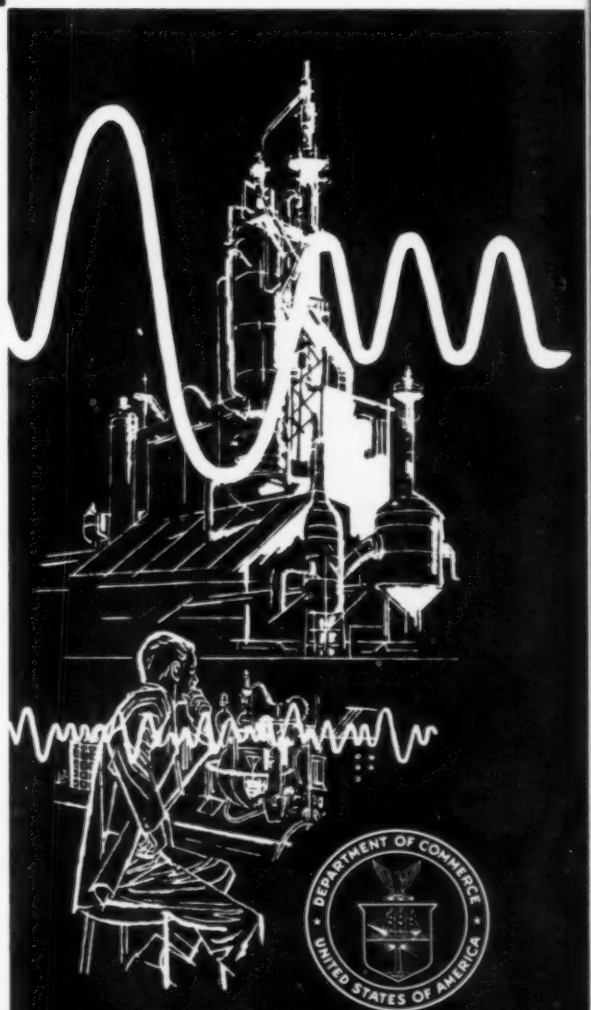

U. S. DEPARTMENT OF COMMERCE
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Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

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CONTENTS

PAGE NOS.

SUBJECT INDEX NI-1

SUBJECT DIVISIONS

1 AIRCRAFT AND FLIGHT EQUIPMENT 1
2 ASTRONOMY, GEOPHYSICS, AND GEOGRAPHY 3
3 CHEMICAL WARFARE EQUIPMENT AND MATERIALS ... 12
4 CHEMISTRY 13
5 COMMUNICATIONS 16
6 DETECTION 18
7 ELECTRICAL EQUIPMENT 21
8 ELECTRONICS AND ELECTRONIC EQUIPMENT 26
9 FLUID MECHANICS 37
10 FUELS AND COMBUSTION 45
11 GROUND TRANSPORTATION EQUIPMENT 46
12 GUIDED MISSILES 46
13 INSTALLATIONS AND CONSTRUCTION 49
14 MATERIALS (NON-METALLIC) 50
15 MATHEMATICS 59
16 MEDICAL SCIENCES 66
17 METALLURGY 82
18 MILITARY SCIENCES AND OPERATIONS 92
19 NAVIGATION 93
20 NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY 93
21 NUCLEAR PROPULSION 96
22 ORDNANCE 97
23 PERSONNEL AND TRAINING 101
24 PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES 102
25 PHYSICS 103
26 PRODUCTION AND MANAGEMENT 115
27 PROPULSION SYSTEMS 118
28 PSYCHOLOGY AND HUMAN ENGINEERING 120
29 QUARTERMASTER EQUIPMENT AND SUPPLIES 123
30 RESEARCH AND RESEARCH EQUIPMENT 125
31 SHIPS AND MARINE EQUIPMENT 132
32 MISCELLANEOUS ARTS AND SCIENCES 132
33 TRANSPORTATION 134

CONTENTS (CON.)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

	Page
BIBLIOGRAPHY	S-1
AGRICULTURE	S-1
ASTRONOMY	S-1
BIOLOGICAL SCIENCES	S-1
CHEMISTRY	S-4
EARTH SCIENCES	S-6
ENGINEERING	S-7
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	S-21
MATERIALS	S-21
MATHEMATICS	S-26
MECHANICS	S-27
METALLURGY	S-29
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	S-31
PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT	S-40
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT	S-43
SOCIAL SCIENCES	S-44
AD INDEX	S-45
NUMBER INDEX	S-47
SUBJECT INDEX	S-49

This issue includes:

TAB 63 - 2 - 1

AD-291 900 - AD-293 699

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SUBJECT INDEX

***ABRASIVES**

DEVELOPMENT OF SPECIFICATION REQUIREMENTS FOR MINERAL TYPE ABRASIVES; CHEMICAL ANALYSIS; PHYSICAL PROPERTIES; TEST METHODS.
AD-293 007L DIV. 19A

***ABSORPTION**
INTESTINE

THE PHOSPHATIDO-PEPTIDE FRACTION EXTRACTED FROM INTESTINE IS SHOWN TO MARKEDLY INCREASE THE INTESTINAL ABSORPTION OF THE QUATERNARY AMINES DIXYPHENURIUM, HEXAMETHONIUM, SECRIPAN, BE-2DIMETHYLAMINE, AND TUBOCURARINE. THE DIFFERENCE IN THE RATES OF INTESTINAL ABSORPTION OF 4 SALTS OF 2-PAM WAS ALSO STUDIED IN AN ISOLATED LOOP.
AD-293 272 DIV. 16

***ABSTRACTING**

REVIEW OF AIR FORCE MATERIALS RESEARCH AND DEVELOPMENT PROGRAM. ABSTRACTS OF REPORTS CONCERNED WITH THE FOLLOWING: METALS AND CERAMICS, NON-METALLIC MATERIALS, PHYSICS, MANUFACTURING TECHNOLOGY, APPLICATION STUDIES.
AD-292 152 DIV. 14

ABSTRACTS OF ARTICLES ON HIGH STRENGTH ALLOYS, LIGHT METALS, NONMETALLICS, AND REFRACTORY METALS.
AD-293 276 DIV. 17

***ACCELERATION**
RADAR ANALYSIS

CARTESIAN VELOCITY AND ACCELERATION FROM RANGE-ONLY DATA.
AD-292 116 DIV. 6

***ACCELEROMETERS**

CALCULATION AND CONSTRUCTION OF AN ACCELERATING SYSTEM FOR A LINEAR ACCELERATOR WITH INTENSIVE FOCUSING.
AD-292 661 DIV. 25

***ACETYLCHOLINES**

THE EFFECT OF DRUGS ON CATECHOLAMINE CONTENT OF THE HEART AND ON THE PHOSPHORYLASE ACTIVITY OF THE HEART, LIVER, AND MUSCLE. THE EFFECT OF VARYING THE AMOUNTS OF DPN, AMP, ETC., ON CARBOHYDRATE METABOLISM IN CELL-FREE HEART HOMOGENATES.
AD-293 614 DIV. 16

***ACOUSTICS**

PAY ACOUSTICAL MODEL OF THE OCEAN USING A DEPTH-SOUND SPEED PROFILE WITH A CONTINUOUS FIRST DERIVATIVE.
AD-291 907 DIV. 25

SUMMARY OF THE SCOPE OF THE FOURTH ALL-UNION ACOUSTIC CONFERENCE HELD IN MOSCOW, MAY-JUNE 1962.
AD-292 182 DIV. 25

COUPLED MODE THEORY OF ACOUSTIC WAVE AMPLIFIERS.
AD-292 329 DIV. 8

THE MERITS OF A METHOD FOR CLASSIFYING THE GROSS ACOUSTICAL PERFORMANCE OF NOISE SUPPRESSORS.
AD-292 702 DIV. 25

***ACRIDINES**

INVESTIGATION OF VARIOUS FLUOROCHROMES FOR POSSIBLE DIFFERENTIATION BETWEEN ORGANIC AND INORGANIC PARTICLES AS A METHOD FOR MONITORING BY AGE(TS.
AD-293 206 DIV. 3

***ACRYLIC RESINS**

NITROSOALLYL POLYFLUORIDES SYNTHESIZED TO DEVELOP UNSATURATED FLUORO-OLEFIN COMPOUNDS WHICH ARE OIL AND FUEL RESISTANT AND RETAIN ELASTICITY AT LOW TEMPERATURES.
AD-292 098 DIV. 4

ACRYLIC PAINT SYSTEM - DRYING CHARACTERISTICS, CORROSION INHIBITION, COLOR STABILITY, WEATHER RESISTANCE, LUBRICANT RESISTANCE.
AD-292 276 DIV. 14

***ADHESION**

PERFORMANCE TESTS OF BONDS MADE WITH SCOTCH-WELD AF31 ADHESIVE ON CU-PLATED 4130 STEEL, TREATED WITH IRIDITE #8 CONVERSION COATING.
AD-292 293 DIV. 14

INVESTIGATIONS IN THE FIELD OF SURFACE FORCES: COLLECTION OF 8 TECHNICAL REPORTS TRANSLATED FROM RUSSIAN.
AD-292 623 DIV. 25

***ADHESIVES**

COMPARISON OF DEGRADATION OF ADHESIVE BONDS BY IR AND OVEN HEATING; ADHESIVE BONDING OF STAINLESS STEEL.
AD-291 912 DIV. 14

PERFORMANCE TESTS OF BONDS MADE WITH SCOTCH-WELD AF31 ADHESIVE ON CU-PLATED 4130 STEEL, TREATED WITH IRIDITE #8 CONVERSION COATING.
AD-292 293 DIV. 14

EFFECT TIMES TO REACH CURE TEMPERATURE ON LAP SHEAR STRENGTH AF-31 AND PLASTILOCK 490 ADHESIVE AL ALLOY SKIN-BONDED SPECIMENS.
AD-292 298 DIV. 14

***ADJUSTMENT (PSYCHOLOGY)**
RADAR OPERATORS

THE EMOTIONAL ADJUSTMENT OF RADAR OBSERVERS ASSIGNED TO A JET INTERCEPTOR SQUADRON BASED IN THE SUB-ARCTIC WAS INVESTIGATED.
AD-293 191 DIV. 28

***AERIAL PHOTOGRAPHY**
DATA PROCESSING SYSTEMS

ANALYSIS OF PHOTOGRAPHIC IMAGERY SCREENING TECHNIQUES AND TACTICAL TARGET RECOGNITION PROCESSES FOR HIGH-SPEED SCANNING OF AERIAL PHOTOGRAPHY.
AD-293 616 DIV. 24

***AERIAL RECONNAISSANCE**
AUTOMATION

ANALYSIS OF PHOTOGRAPHIC IMAGERY SCREENING TECHNIQUES AND TACTICAL TARGET RECOGNITION PROCESSES FOR HIGH-SPEED SCANNING OF AERIAL PHOTOGRAPHY.
AD-293 616 DIV. 24

***AERODYNAMIC CONFIGURATIONS**

PRESSURE DRAG REDUCTION AS A RESULT OF OPTIMIZING AN AFTERBODY SHAPE.
AD-293 608 DIV. 12

***AERODYNAMICS**

USE OF VARIATIONAL METHODS IN PROBLEMS OF VIBRATION OF LIQUID AND LIQUID-FILLED BODIES. UNIVERSALITY AND STANDARDIZATION OF COMPUTER PROGRAMMING ARE SEEN AS POTENTIAL ADVANTAGES.
AD-292 340 DIV. 9

PARAMETRIC ACCURACY STUDY OF A DECAY-DAMPING RELATIONSHIP.
AD-292 349 DIV. 9

***AERODYNAMICS**
SCIENTIFIC RESEARCH

DESIGN CONFIGURATION FOR AIRCRAFT OF THE FUTURE. USSR TRANSLATION.
AD-292 220 DIV. 1

***AEROSOLS**

INVESTIGATIONS IN THE FIELD OF SURFACE FORCES: COLLECTION OF 8 TECHNICAL REPORTS TRANSLATED FROM RUSSIAN.
AD-292 623 DIV. 25

***AEROSOLS**
DETECTION

AEROSOL FLASH CAMERA AND ELECTROCHEMICAL DETECTOR FOR DETECTION AND ANALYSIS OF VX PARTICLE SIZE. MAIN COMPONENTS OF THE AEROSOL CAMERA ARE: FLASH ILLUMINATOR, OBJECTIVE LENS, IMAGE INTENSIFIER TUBE AND TV CAMERA.
AD-293 260 DIV. 3

***AEROSOLS**
DIFFUSION

DEVELOPMENT OF A FIBERBOARD WITH RESISTANCE TO PENETRATION BY TOXIC GAS AEROSOLS.
AD-293 437 DIV. 14

***AIR**

NONEQUILIBRIUM FLOW OF AIR IN NOZZLES; KINETICS OF ESTABLISHING EQUILIBRIUM BETWEEN PROGRESSIVE AND INERT DEGREES OF FREEDOM OF MOLECULES AT HIGH TEMPERATURES.
AD-292 225 DIV. 9

DESIGN AND DEVELOPMENT OF REGENERATIVE CO2 SORBERS; MOLECULAR SIEVES AND 4A2Z SORPTION SYSTEMS; THEORETICAL CONSIDERATIONS OF MASS TRANSFER.
AD-293 224 DIV. 26

***AIR**
MOTION

TRANSFER THROUGH THE TROPOPAUSE AND WITHIN THE STRATOSPHERE.
AD-292 090 DIV. 2

***AIR CONDITIONING EQUIPMENT**
REDUCTION

PROPOSED TESTS TO DETERMINE THE POSSIBILITY OF REMOVING OR REDUCING THE AIR CONDITIONING NOW REQUIRED BY THE PERSHING MISSILE GUIDANCE AND CONTROL COMPARTMENT.
AD-292 948 DIV. 12

***AIR CONTROL CENTERS**
TARGETS

MULTIPLE AIRBORNE TARGET TRAJECTORY SYSTEM (MATTS) EVALUATION STUDY.
AD-292 180 DIV. 6

***AIR FORCE LOGISTICS**
MAINTENANCE

HOW RESPONSIVE THE AIR FORCE SYSTEM SHOULD BE IN TRANSLATING CHANGING SUPPORT NEEDS INTO WORKLOADS IN BACK UP AREAS OF SUPPORT.
AD-293 431 DIV. 16

***AIR FORCE OPERATIONS**

THE DYNAPD AIR FORCE BASE MAINTENANCE MANAGEMENT PROGRAM, I.E., EVALUATION, UTILIZATION, SCHEDULING.
AD-292 909 DIV. 23

HOW RESPONSIVE THE AIR FORCE SYSTEM SHOULD BE IN TRANSLATING CHANGING SUPPORT NEEDS INTO WORKLOADS IN BACK UP AREAS OF SUPPORT.
AD-293 431 DIV. 16

***AIR FORCE OPERATIONS**
VULNERABILITY

THE IMPACT OF ATTRITION ON SUSTAINED OFFENSIVE AIR OPERATIONS.
AD-293 147 DIV. 18

***AIR MASS ANALYSIS**

TRANSFER THROUGH THE TROPOPAUSE AND WITHIN THE STRATOSPHERE.
AD-292 090 DIV. 2

DIRECT MEASUREMENT OF THE MERIDIONAL CIRCULATION IN THE STRATOSPHERE DURING THE IGY.
AD-292 145 DIV. 2

***AIR RAID SHELTERS**

AN ECONOMICAL, ARCH-SHAPED SHELTER, UTILIZING PNEUMATICALLY-PLACED MORTAR, PROVIDES PROTECTION FOR 100 MPH AND AN OVERPRESSURE OF 100 PSI.
AD-292 930 DIV. 13

***AIR TRAFFIC CONTROL SYSTEMS**

CONTROL, SWITCHING AND DISPLAY EQUIPMENT FOR VISUAL COMMUNICATIONS IN AIR TRAFFIC CONTROL.
AD-291 908 DIV. 19

***AIR TRAFFIC CONTROL SYSTEMS**
RADAR BEACONS

RADAR TEST SET AN/APM-123; RADAR SET TS-1314.
AD-292 048 DIV. 6

***AIRCRAFT**
LIFE EXPECTANCY

THE IMPACT OF ATTRITION ON SUSTAINED OFFENSIVE AIR OPERATIONS.
AD-293 147 DIV. 18

***AIRCRAFT**
STABILITY (LATERAL)

HANDLING QUALITIES IN SINGLE-LOOP ROLL TRACKING TASKS.
AD-293 236 DIV. 1

***AIRCRAFT AMMUNITION**
CARTRIDGES

FABRICATION AND EVALUATION OF FINAL ENGINEERING LOT NO. FA-X3M-2580 OF T-230E1, BALL, 30MM CARTRIDGE.
AD-293 161 DIV. 22

***AIRCRAFT EQUIPMENT**

THEORETICAL EXPLANATION OF OBSERVED DECREASING FAILURE RATE.
AD-293 692 DIV. 26

***AIRCRAFT FINISHES**

ACRYLIC PAINT SYSTEM - DRYING CHARACTERISTICS, CORROSION INHIBITION, COLOR STABILITY, WEATHER RESISTANCE, LUBRICANT RESISTANCE.
AD-292 276 DIV. 14

***AIRCRAFT INDUSTRY**

AERODYNAMIC INDUSTRY -- ARTICLES ON NOISE SUPPRESSION AND MEASUREMENT. USSR TRANSLATION.
AD-292 608 DIV. 1

***AIRPLANE ANTENNAS**

A LIGHTWEIGHT, MINIATURE SYSTEM FOR AUTOMATICALLY CONTROLLING THE RADIATION PATTERN OF BEACON ANTENNA ARRAYS MOUNTED ON MISSILES AND AIRCRAFT.
AD-292 641 DIV. 6

***AIRPLANE PROTUBERANCES**
REFUELING IN FLIGHT

PROTOTYPE DEVELOPMENT OF MODEL 385 AIR REFUELING STORE.
AD-293 628 DIV. 1

***AIRPLANES**
USSR

DESIGN CONFIGURATION FOR AIRCRAFT OF THE FUTURE. USSR TRANSLATION.
AD-292 220 DIV. 1

***ALBEDO**
ARCTIC REGIONS

TABULATION OF AREAS OCCUPIED BY 5 PERCENT ALBEDO CLASSES PER 5 DEGREE LATITUDE BELT.
AD-292 243 DIV. 2

***ALBEDO**
GAMMA RAYS

MATHEMATICAL APPROACH TO ECONOMY OF EXPERIMENT IN DETERMINATIONS OF THE DIFFERENTIAL ENERGY ALBEDO OF GAMMA RAYS.
AD-291 904 DIV. 20

***ALDEHYDES**

IR SPECTRAL DATA FOR 61 ALDEHYDES; SPECTRA-STRUCTURE CORRELATION; ALIPHATIC, AROMATIC, ALPHA-OLEFINIC, BENZALDEHYDES.
AD-292 288 DIV. 4

***ALGAE**
BIOCHEMISTRY

CHEMISTRY OF ALGAL BILIPROTEINS.
AD-292 679 DIV. 16

***ALGEBRA**

A COMPLETE MEASURE SPACE HAS THE LIFTING PROPERTY IF AND ONLY IF THE WHOLE SPACE IS A DIRECT SUM OF SUMMABLE SUBSETS PLUS PERHAPS A LOCALLY NULL SET.
AD-292 753 DIV. 15

***ALGEBRAS**

REALIZABILITY CONDITIONS OF SINGLE-CONTACT NETWORKS.
AD-293 103 DIV. 8

***ALKALI METALS**

INSTRUMENTATION FOR MEASUREMENT OF VAPOR PRESSURE OF ALKALI METALS (CS, K, NA, LI) FROM 10 TO THE -9TH POWER TO 10 TO THE -2ND POWER MM HG.
AD-292 216 DIV. 4

***ALKALI METALS**
CHEMICAL IMPURITIES

DETERMINATION OF GASES (O,H) IN ALKALI METALS AND THEIR ALLOYS BY HG EXTRACTION; SAMPLE PREPARATION FOR VACUUM EXTRACTION.
AD-292 618 DIV. 4

***ALL-WEATHER AVIATION**
ECONOMICS

ECONOMIC IMPACT OF WEATHER INFORMATION ON AVIATION OPERATIONS.
AD-292 672 DIV. 1

***ALLOYS**

MECHANICAL PROPERTIES OF SPOT WELDED, BUTT WELDED, AND RIVETED JOINTS OF HASTELLOY R235 AND HAYNES ALLOY NO. 25 NI BASE ALLOYS.
AD-293 096 DIV. 17

ABSTRACTS OF ARTICLES ON HIGH STRENGTH ALLOYS, LIGHT METALS, NONMETALLICS, AND REFRACTORY METALS.
AD-293 870 DIV. 17

***ALLOYS**
CHEMICAL IMPURITIES

DETERMINATION OF GASES (O,H) IN ALKALI METALS AND THEIR ALLOYS BY HG EXTRACTION; SAMPLE PREPARATION FOR VACUUM EXTRACTION.
AD-292 618 DIV. 4

***ALLOYS**
HEAT TREATMENT

COLD HARDENING, RECRYSTALLIZATION OF ET617 ALLOY; FORGING; DEFORMATION; PLASTICITY; MICROSTRUCTURE.
AD-292 200 DIV. 17

***ALLOYS**
MACHINING

COLD-HARDENED LAYERS OF STEEL BY GRINDING; ELECTRIC SPARK WORKING OF HEAT-RESISTANT ALLOYS ON A NI BASE; ELECTRODES.
AD-292 223 DIV. 17

***ALLOYS**
MECHANICAL PROPERTIES

EFFECT OF HEAT TREATING VARIABLES AND ELEVATED TEMPERATURES ON MECHANICAL PROPERTIES OF HIGH OXYGEN CONTENT 6AL-4V TITANIUM ALLOY STRESS STABILITY TESTS.
AD-292 280 DIV. 17

EFFECT OF HEAT TREATMENT, ELEVATED TEMPERATURE, EXPOSURE, AND SALT SPRAY EXPOSURE ON MECHANICAL PROPERTIES OF AL ALLOY SHEET.
AD-292 283 DIV. 17

ULTIMATE SHEAR STRENGTH OF 1/8 AND 5/32 INCH DIAMETER MONEL METAL, NICKEL BASE ALLOY, RIVET WIRE WITH STEEL SHEAR JIGS; YIELD STRENGTH IN AL ALLOY SHEET.
AD-292 294 DIV. 17

SEVERITY AND ELIMINATION OF THE BAUSCHINGER EFFECT IN 10% COLD WORKED HASTELLOY R-235 NI ALLOY; MECHANICAL PROPERTIES; PLASTIC DEFORMATION.
AD-293 097 DIV. 17

EFFECT OF 1500 F EXPOSURE ON THE MECHANICAL PROPERTIES OF 10% COLD WORKED HASTELLOY R-235 NI ALLOY STRIPS.
AD-293 100 DIV. 17

***ALLYL RADICALS**

NITROSOALLYL POLYFLUORIDES SYNTHESIZED TO DEVELOP UNSATURATED FLUORO-OLEFIN COMPOUNDS WHICH ARE OIL AND FUEL RESISTANT AND RETAIN ELASTICITY AT LOW TEMPERATURES.
AD-292 098 DIV. 4

***ALPHA SPECTRA**
AGING

AGING AL ALLOYS; DYNAMIC MODULUS TECHNIQUES; EFFECT ELASTIC COHERENCY STRAINS; MECHANICAL PROPERTIES.
AD-292 260 DIV. 17

***ALUMINUM**

MECHANICAL PROPERTIES OF AL AND REINFORCED AL HONEYCOMB CORES; DENSITY, FOIL THICKNESS, COMPRESSIVE STRENGTH, AND SHEAR CHARACTERISTICS.
AD-291 995 DIV. 17

EFFECT OF CORE THICKNESS ON SHEAR PROPERTIES OF AL HONEYCOMB CORE MATERIAL; PREPARATION OF SPECIMENS AND EVALUATION PROCEDURES.
AD-292 008 DIV. 17

RELATION OF MECHANICAL, TEXTURAL, AND THERMAL EXPANSION PROPERTIES TO STRUCTURE IN SINTERED ALUMINUM POWDER FROM 550 TO 800 C.
AD-292 061 DIV. 17

CALCULATION VIBRATION DAMPING SANDWICH CONSTRUCTION FROM ELASTIC PROPERTIES, ENERGY ABSORPTION, DIRECT STRESS VIBRATION FACING MATERIALS, AND SHEAR VIBRATION CORE MATERIALS.
AD-293 412 DIV. 14

***ALUMINUM**
ALUMINUM COATINGS

ALUMINUM HARD COATING OF ORDNANCE MATERIEL. THE ALUMILITE 220 PROCESS WAS SELECTED FOR ITS COMPARATIVE SIMPLICITY AND EFFICIENCY. SOME MODIFICATION AND USE OF AN INDEPENDENT SENSING CONTROL CIRCUIT PRODUCED EXCEPTIONAL RESULTS.
AD-293 275 DIV. 26

***ALUMINUM**
DEFORMATION

ORIGIN OF DEFORMATION BANDS. DEVELOPMENT OF TECHNIQUES FOR THE STUDY OF THE RELATION BETWEEN ACCIDENTAL BENDINGS AND THE NUCLEATION OF DEFORMATION BANDS.
AD-292 976 DIV. 17

***ALUMINUM**
SANDWICH PANELS

COMPRESSIVE AND SHEAR PROPERTIES OF 2 CONFIGURATIONS OF SANDWICH CORES OF CORRUGATED AL FOIL. COMPRESSIVE AND SHEAR STRENGTH VALUES WERE LOWER FOR CROSSBANDED CORE THAN FOR HONEYCOMB CORE.
AD-293 413 DIV. 1

***ALUMINUM ALLOYS**

SELECTION OF CANOPY SEAL ANTI-FREEZE LUBRICANT.
AD-292 292 DIV. 14

***ALUMINUM ALLOYS**
BONDING

EFFECT TIMES TO REACH CURE TEMPERATURE ON LAP SHEAR STRENGTH AF-31 AND PLASTILOCK 650 ADHESIVE AL ALLOY SKIN-HONEYCOMB CORE SPECIMENS.
AD-292 298 DIV. 14

***ALUMINUM ALLOYS**
CREEP

TOTAL CREEP AT 260 F FOR 100 HRS OF AL-CLAD ALUMINUM ALLOY SHEET AND EXTRUDED ALUMINUM ALLOY.
AD-293 410 DIV. 17

STRESS-STRAIN, CREEP PROPERTIES AL ALLOY X2020-T4 FROM 10 SEC TO 1/2 HR DURATION.
AD-293 663 DIV. 17

***ALUMINUM ALLOYS**
DAMPING

CALCULATION VIBRATION DAMPING SANDWICH CONSTRUCTION FROM ELASTIC PROPERTIES, ENERGY ABSORPTION, DIRECT STRESS VIBRATION FACING MATERIALS, AND SHEAR VIBRATION CORE MATERIALS.
AD-293 412 DIV. 14

***ALUMINUM ALLOYS**
GUIDED MISSILES

STRESS-STRAIN, CREEP PROPERTIES AL ALLOY X2020-T4 FROM 10 SEC TO 1/2 HR DURATION.
AD-293 663 DIV. 17

***ALUMINUM ALLOYS**
MECHANICAL PROPERTIES

TENSILE AND COMPRESSION STRENGTHS OF ALUMINUM ALLOY SHEETS AFTER SHORT PERIODS AT ELEVATED TEMPERATURES - 300-900 F FOR TWO MINUTES.
AD-292 259 DIV. 17

MECHANICAL AND CORROSIVE PROPERTIES OF 2024-T86 AL ALLOY SHEET MATERIAL; TENSILE PROPERTIES; ELONGATION; ELASTICITY; STRESS-STRAIN CURVES; SALT SPRAY EXPOSURE TESTS.
AD-292 271 DIV. 17

EFFECT OF HEAT TREATMENT, ELEVATED TEMPERATURE, EXPOSURE, AND SALT SPRAY EXPOSURE ON MECHANICAL PROPERTIES OF AL ALLOY SHEET.
AD-292 283 DIV. 17

***ALUMINUM ALLOYS**
PHYSICAL PROPERTIES

MECHANICAL AND PHYSICAL PROPERTIES OF ALUMINUM ALLOYS UNDER VARIOUS CONDITIONS TEMPERATURES BETWEEN -400 AND 400 F INCLUDING TESTS OF WELDED SAMPLES.
AD-292 635 DIV. 17

***ALUMINUM ALLOYS**
SHEETS

EVALUATION OF FIRE RETARDANT COATINGS ON ALUMINUM ALLOY SUBSTRATE; ALBI 99, THERMO-CLAD 94HAL, AND DUO-TEX EVALUATED UNDER FLAME AND HOT AIR IMPINGEMENT.
AD-292 278 DIV. 14

***ALUMINUM ALLOYS**
STRESSES

STRESS-STRAIN, CREEP PROPERTIES AL ALLOY X2020-T4 FROM 10 SEC TO 1/2 HR DURATION.
AD-293 663 DIV. 17

*ALUMINUM COATINGS
ORDNANCE

PLUMINUM HARD COATING OF ORDNANCE MATERIEL. THE ALUMILITE 220 PROCESS WAS SELECTED FOR ITS COMPARATIVE SIMPLICITY AND EFFICIENCY. SOME MODIFICATION AND USE OF AN INDEPENDENT SERVING CONTROL CIRCUIT PRODUCED EXCEPTIONAL RESULTS.
AD-293 275 DIV. 26

*ALUMINUM COMPOUNDS

AL2O3 WHISKERS FOR REINFORCING 80-20 AT-CR ALLOY AND IRON: TENSILE PROPERTIES: BONDING: H-REDUCED; EFF FIBER LOADING.
AD-291 917 DIV. 14

*AMINO ACIDS
EXCRETION

CONSIDERABLE NITROGEN AND AMINO ACIDS ARE EXCRETED UNDER CONDITIONS CAUSING PROFUSE SWEATING. THESE NITROGEN LOSSES HAVE BEEN IGNORED IN MOST STUDIES ON BALANCE.
AD-292 947 DIV. 16

*AMMONIA

GENERATION OF HYDROGEN FOR FUEL CELLS IN SUBMARINE PROPULSION.
AD-292 246 DIV. 4

*AMPLITUDE MODULATION

AN INSTANCE OF AMPLITUDE ERROR DISCRETIZATION OF SIGNALS.
AD-292 607 DIV. 8

*AMPUTEES

EXPERIMENTAL SURGERY WAS PERFORMED ON DOGS TO UNITE A COMPLETELY AMPUTATED LEG AFTER ARTIFICIAL PERFUSION. HISTOLOGICAL CHANGES IN MUSCLE FIBERS DEVELOPED TWO HOURS AFTER AMPUTATION. OXYGEN CONSUMPTION WAS KEPT AT NEARLY CONTROL LEVEL IN LEGS WITHOUT CIRCULATION FOR FOUR HOURS.
AD-292 267 DIV. 16

*ANALOG COMPUTER

RESULTS OF A TANK COMPUTER MINIATURIZATION STUDY TO SIMPLIFY AND MINIATURIZE ELECTRONIC ANALOG TANK BALLISTIC COMPUTERS.
AD-293 210 DIV. 30

*ANALYSIS OF VARIANCE

FORTRAN PROGRAM TO ESTIMATE CUMULATIVE SURVIVAL PROBABILITY AND VARIANCE.
AD-293 154 DIV. 30

*ANESTHESIA
MEDICAL EQUIPMENT

EQUIPMENT TO ADMINISTER HALOTHANE ANESTHESIA TO CONTROL MECHANICAL VENTILATION; EXTERNAL HEART COMPRESSION TECHNIQUES; ANESTHESIA IN EMPHYSEMATOUS PATIENTS; A TEST-STRIP METHOD FOR DETERMINATION OF PLASMA CHOLINESTERASE; AND ELECTROMYOGRAPHIC STUDIES OF RESPIRATORY MUSCLES ARE DESCRIBED.
AD-293 404 DIV. 16

*ANTENNA RADIATION PATTERNS

A LIGHTWEIGHT, MINIATURE SYSTEM FOR AUTOMATICALLY CONTROLLING THE RADIATION PATTERN OF BEACON ANTENNA ARRAYS MOUNTED ON MISSILES AND AIRCRAFT.
AD-292 641 DIV. 8

*ANTENNAS

FRESNEL GAIN OF APERTURE ANTENNA.
AD-291 956 DIV. 8

SUMMARY OF LONG TERM RESEARCH ON SURFACE CURRENT MEASUREMENTS, ANTENNA PATTERN SYNTHESIS, ARTIFICIAL DIELECTRIC MEDIA AND NETWORK SYNTHESIS.
AD-292 989 DIV. 8

THE DISPERSION RELATION FOR WAVES PROPAGATING OBLIQUELY THROUGH A STRIP MEDIUM.
AD-292 990 DIV. 8

REACTIVE ENERGY AND Q ASSOCIATED WITH ANTENNAS.
AD-292 991 DIV. 8

*ANTENNAS
PHASE STUDIES

PHASE CENTERS. THEORETICAL TREATMENT OF ANTENNA ARRAYS AND RADIATION PATTERNS.
AD-292 749 DIV. 8

*ANTIBODIES

PURIFICATION STUDIES WERE MADE OF LEUCOZYMES OF GUINEA PIG LEUCOCYTES AND THE STUDIES OF THEIR NATURE WERE CONTINUED. THE COMPLETE SEPARATION OF LEUCOZYME FROM LYSOZYME WAS ACHIEVED AND THIS PREPARATION HAD NO EFFECT ON THE MACROPHYTES. LEUCOZYME A BETA STOPS OXYGEN UPTAKE AND CAUSES CYTOPLASMIC DESTRUCTION OF NONPATHOGENIC STAPHYLOCOCCI. AVIRULENT AND VIRULENT CHARACTERISTICS WERE OBSERVED IN OTHER TEST ANIMALS WHICH WERE SUBJECTED TO INFECTIONS OF PNEUMOCOCCI, ESCHERICHIA COLI, SHIGELLA, AND SALMONELLA STRAINS. THE ATTACK POINT OF PLAKIN ON THE CHAIN OF RESPIRATORY SYSTEM OF D. NEGATERIUM WAS CLARIFIED. PHOSPHOLIPIDS OF CYTOPLASMIC MEMBRANE WERE THE MAIN ATTACK POINT OF PLAKIN AND IT WAS THE CAUSE OF THE DAMAGE OF THE ELECTRON TRANSFERRING SYSTEM.
AD-292 263 DIV. 16

*ANTIBODIES
SALIVA

AN IMMUNOLOGICAL STUDY OF SALIVARY PROTEINS. METHODS OF STERILIZATION OF THE SALIVA ARE COMPARED.
AD-292 942 DIV. 16

*ANTIMONIDES

HALL EFFECT INVESTIGATIONS; GALVANOMAGNETIC MEASUREMENTS ON EVAPORATED THIN FILMS OF INSB ON GLASS SUBSTRATES; MAGNETORESISTIVE CONTRIBUTION OF INSB FILMS.
AD-293 433 DIV. 27

*ANTIMONIDES
MASS SPECTROSCOPY

MASS SPECTROGRAPHIC EVIDENCE FOR DEVIATIONS FROM STOICHIOMETRY IN GASB. EVIDENCE INDICATES PROBABILITY THAT THE ACCEPTORS IN THE PUREST AVAILABLE GASB ARE LATTICE DEFECTS RATHER THAN IMPURITIES.
AD-293 348 DIV. 25

*ANTITANK AMMUNITION
MANUFACTURING METHODS

INVESTIGATION OF DEFECTS IN T-394 HEAT SHELL CASES.
AD-292 092 DIV. 22

*ANXIETY
FACTOR ANALYSIS

EFFECTS OF ANXIETY LEVEL AND MILD SITUATIONAL STRESS ON VARIOUS PSYCHOLOGICAL FUNCTIONS. THE INTERRELATIONSHIPS AMONG THESE FUNCTIONS, ANXIETY LEVEL AND OTHER PERSONALITY VARIABLES. A MULTIVARIATE AND FACTORIAL STUDY.
AD-292 795 DIV. 26

*APTITUDE TESTS
MAINTENANCE PERSONNEL

AN ASSESSMENT OF CAPABILITIES OF FLEET PERSONNEL IN ORDER TO DEVISE AND REFINE CURRICULUM REQUIREMENTS FOR ON-THE-JOB TRAINING OF MISSILE TECHNICIANS.
AD-293 239 DIV. 25

*ARCTIC REGIONS

ARCTIC EARTH SCIENCE INVESTIGATIONS CENTERED SO NORTH GREENLAND TO LOCATE AND TEST A POTENTIAL EMERGENCY AIR RESCUE AIRFIELD SITE.
AD-292 749 DIV. 2

*ARCTIC REGIONS
BIBLIOGRAPHY

A BIBLIOGRAPHY OF THE PUBLICATIONS OF THE ARCTIC AEROMEDICAL LABORATORY COVERING THE PERIOD OF 1949-OCT 1962 IS PRESENTED.
AD-293 409 DIV. 16

*ARMING DEVICES
SAFETY DEVICES

XM-52 ARM-SAFE DEVICE.
AD-293 620 DIV. 22

*ARMOR PIERCING AMMUNITION
CARTRIDGE CASES

INVESTIGATION OF DEFECTS IN T-394 HEAT SHELL CASES.
AD-292 092 DIV. 22

*ARMY OPERATIONS

NON-MILITARY APPLICATIONS OF OPERATIONS RESEARCH.
AD-293 671 DIV. 18

*ARRHYTHMIA
THERAPY

IN DOGS WITH VENTRICULAR FIBRILLATION, VARIOUS COMBINATIONS OF EXTERNAL CARDIAC COMPRESSIONS AND LUNG INFLATIONS, EPINEPHRINE AND NOR EPINEPHRINE, AND PLASMA EXPANDERS WERE STUDIED. EFFECTS ON ARTERIAL PRESSURE, BLOOD FLOW, O2 AND CO2 SATURATION, AND PH VALUES, E.E.G. AND EKG WERE MEASURED. CLINICAL TESTS WERE ALSO REPORTED.
AD-293 419 DIV. 16

*ARSENIDES

GROWTH OF GALLIUM ARSENIDE SINGLE CRYSTALS.
AD-292 709 DIV. 25

*ARTIFICIAL RESPIRATION

IN DOGS WITH VENTRICULAR FIBRILLATION, VARIOUS COMBINATIONS OF EXTERNAL CARDIAC COMPRESSIONS AND LUNG INFLATIONS, EPINEPHRINE AND NOR EPINEPHRINE, AND PLASMA EXPANDERS WERE STUDIED. EFFECTS ON ARTERIAL PRESSURE, BLOOD FLOW, O2 AND CO2 SATURATION, AND PH VALUES, E.E.G. AND EKG WERE MEASURED. CLINICAL TESTS WERE ALSO REPORTED.
AD-293 419 DIV. 16

*ARTIFICIAL RESPIRATION
METABOLISM

EXPERIMENTAL SURGERY WAS PERFORMED ON DOGS TO UNITE A COMPLETELY AMPUTATED LEG AFTER ARTIFICIAL PERFUSION. HISTOLOGICAL CHANGES IN MUSCLE FIBERS DEVELOPED TWO HOURS AFTER AMPUTATION. OXYGEN CONSUMPTION WAS KEPT AT NEARLY CONTROL LEVEL IN LEGS WITHOUT CIRCULATION FOR FOUR HOURS.
AD-292 267 DIV. 16

*ASTRONAUTICS

A REVIEW BASED ON SOVIET OPEN-LITERATURE SOURCES (CHIEFLY NEWSPAPERS) PUBLISHED IN THE PERIOD AUGUST-OCTOBER 1962, CONCERNING THE MEDICAL AND BIOLOGICAL ASPECTS OF THE VOSTOK-3 AND VOSTOK-4 FLIGHTS, INCLUDING SELECTION OF ORBITS, PHYSICAL AND PSYCHOLOGICAL PREPARATION, MEDICAL MONITORING, RADIATION PROTECTION, DIET, CABIN ECOLOGY, AND PROJECTED PROBLEMS FOR INTERPLANETARY FLIGHT.
AD-291 911 DIV. 16

*ASTRONOMICAL OBSERVATORIES

THE SPECTROHELIOGRAPH OF THE CRIMEAN ASTRONOMICAL STATION OF THE MAIN ASTRONOMICAL OBSERVATORY OF THE ACADEMY OF SCIENCES OF THE USSR.
AD-292 613 DIV. 30

*ASTRONOMY

PRINCIPLE FOR PROGRAMMED AUTOMATIC CONTROL OF A TELESCOPE; DETERMINING ATMOSPHERIC TRANSPARENCIES. USSR TRANSLATION.
AD-292 201 DIV. 8

ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE. GLOBULAR STAR CLUSTERS. WOLF-RAYET STAR HD GAMMA 2 VELORUM. H/HE RATIO IN HD 94964. EMISSION NEBULOSITIES IN SMALL AND LARGE MAGELLANIC CLOUDS. SPECTRUM OF HSC 7009.
AD-292 680 DIV. 2

A ONE METRE MIRROR FOR MOON TRACKING AND PHOTOGRAPHY.
AD-292 741 DIV. 2

*ATMOSPHERE

TRANSFER THROUGH THE TROPOPAUSE AND WITHIN THE STRATOSPHERE.
AD-292 090 DIV. 2

RADIATION BALANCE OF THE NORTHERN HEMISPHERE.
AD-292 317 DIV. 20

PHYSICAL PROPERTIES OF THE UPPER ATMOSPHERE.
AD-293 673 DIV. 2

*ATMOSPHERICS

DENSITY DISTRIBUTION, INTERLEVEL CORRELATIONS AND VARIATION WITH WIND.
AD-291 926 DIV. 2

TWINKLING OF LIGHT SOURCES ON THE EARTH AND OTHER NOTES.
AD-292 230 DIV. 2

THE CIRCULATION OF AIR IN AND NEAR VALLEYS AND MOUNTAINS. OBSERVATIONS WERE MADE PRIMARILY IN THE SUMMER MONTHS.
AD-292 499 DIV. 2

STUDIES DEALING WITH THE PHYSICAL PROCESSES INVOLVED IN THE EXCHANGE OF ENERGY BETWEEN THE ATMOSPHERE AND THE EARTH'S SURFACE.
AD-293 450 DIV. 2

*ATOMIC ENERGY LEVELS

THE ALTERNATE MOLECULAR ORBITAL METHOD: AP-

PLICATION TO CYCLIC SYSTEMS USING BENZENE AS AN EXAMPLE.
AD-293 240 DIV. 25

ATOMIC ORBITALS

THE ALTERNATE MOLECULAR ORBITAL METHOD: APPLICATION TO CYCLIC SYSTEMS USING BENZENE AS AN EXAMPLE.
AD-293 240 DIV. 25

ATOMIC STRUCTURE

EVALUATION OF MATRIX ELEMENTS IN CRYSTALLINE FIELD THEORY.
AD-292 081 DIV. 25

ATOMIZATION

BURNING VELOCITY OF ATOMIZED FUEL: DROPS: VAPORIZATION: THEORY.
AD-292 238 DIV. 10

ATOMS
BEAMS

EXPERIMENTAL MODULATED ATOMIC BEAM TECHNIQUES ADAPTED FOR THE STUDY OF GAS-SURFACE INTERACTIONS.
AD-292 963 DIV. 20

ATTENTION
TRACKING

VARIABLES AFFECTING PERFORMANCE ON VIGILANCE TASK AND LEVEL OF ALERTNESS ON TRACKING.
AD-291 951 DIV. 28

AUDIO AMPLIFIERS

COUPLED MODE THEORY OF ACOUSTIC WAVE AMPLIFIERS.
AD-292 329 DIV. 8

AUDIOFREQUENCY CABLES

TWO-CONDUCTOR LOW-PASS TRANSMISSION LINE WHICH ALLOWS A DESIRED AUDIO CONTROL SIGNAL TO BE DELIVERED TO AN ELECTROEXPLOSIVE DEVICE.
AD-292 110 DIV. 22

AUDIOFREQUENCY TRANSFORMERS

PRELIMINARY EFFORTS TO DEVELOPE A HIGH VOLTAGE: HIGH POWER: AUDIO FREQUENCY TRANSFORMER.
AD-292 272 DIV. 7

AUDITORY PERCEPTION

A COMPREHENSIVE REVIEW OF ALL ASPECTS OF SOUND PERCEPTION: PHYSIOLOGY: ANATOMY: NEUROLOGY: HISTOLOGY: PATHOLOGY: ETC.
AD-293 240 DIV. 16

AUTOMATIC

CERTAIN PROBLEMS IN THE THEORY OF MULTIVARIABLE LINEAR AUTOMATIC CONTROL SYSTEMS ARE DETERMINED AND SOLVED.
AD-292 602 DIV. 8

THE UNIVERSAL AUTOMATIC DIGITAL COMPUTER: URAL-2.
AD-292 621 DIV. 30

AUTOMATION
USSR

TRANSLATION OF PAPERS ON AUTOMATION DURING 1961 IN AVTOMATYKA (RUSSIAN).
AD-292 660 DIV. 90

AVIATION FUELS

FAIRPRENE INTEGRAL FUEL TANK SEALING - MATERIAL - SWELLING CHARACTERISTICS WHEN IMMERSED IN 10 AVIATION FUELS AND 10 TOLUOL (AROMATIC HYDROCARBON) - AVIATION FUEL MIXTURES.
AD-292 387 DIV. 14

AVIATION FUELS
CONTAMINATION

CYTOCHEMICAL ANALYSES OF THE FUNGUS: ASPERGILLUS NIGER REVEALED THE PRESENCE OF CHITIN AND CELLULOSE. ADAPTATION OF STANDARD CYTOCHEMICAL PROCEDURES WERE USED FOR IDENTIFICATION OF CELL WALL MATERIAL IN THE BACTERIA PSEUDOMONAS AERUGINOSA AND ESCHERICHIA COLI WHICH CONTAMINATE AVIATION FUELS. INFORMATION CONCERNING THE NATURE AND LOCATION OF THE RESISTANT SUBSTANCES WHICH MAKE UP THEIR CELL WALLS IS USEFUL IN DEVELOPMENT OF METHODS OF TREATMENT IMPORTANT TO CONTROL OF MICROORGANISMS.
AD-293 226 DIV. 16

AVIATION PERSONNEL

RETENTION OF FIRST ENLISTMENT AIRMEN. ANALYSIS OF RESULTS OF A MATHEMATICAL SIMULATION.
AD-292 951 DIV. 23

AXIALLY SYMMETRIC FLOW

COMPOSITION FORMULAS IN GENERALIZED AXIALLY SYMMETRIC POTENTIAL THEORY.
AD-292 977 DIV. 9

BACTERIA
FRACTIONATION

THE PURIFICATION AND PHYSIOLOGICAL EFFECTS IN MICE AND RATS OF THE HISTAMINE SENSITIZING FACTOR FROM HEMOPHILUS PERTUSSIS.
AD-292 792 DIV. 16

BACTERIA
METABOLISM

THE TRICARBOXYLIC ACID CYCLE AND AUXILIARY REACTIONS SUCH AS THE GLYOXYLATE CYCLE: INDUCTION OF ISO CITRATE LYASE: ETC.: IN BACTERIA.
AD-292 926 DIV. 16

THE METABOLISM OF C1 - COMPOUNDS AND OXALIC ACID: AND THE ENZYMES AND COENZYMES INVOLVED HAVE BEEN STUDIED IN MICROORGANISMS.
AD-293 150 DIV. 16

BACTERIA
PROTEASES

CAROTENOIDS FROM MARINE ALGAE WERE SHOWN TO UNDERGO ANTOXIDATION IN SEA WATER RATHER THAN BREAKDOWN BY BACTERIA. PROTEOLYTIC BREAKDOWN OF CHROMOPROTEINS BY MARINE BACTERIA AND ENZYMES WAS STUDIED AND ADAPTED TO A METHOD OF ISOLATION FOR MARINE BACTERIA.
AD-292 003 DIV. 16

BACTERICIDES

PURIFICATION STUDIES WERE MADE OF LEUCOZYMES OF GUINEA PIG LEUCOCYTES AND THE STUDIES OF THEIR NATURE WERE CONTINUED. THE COMPLETE SEPARATION OF LEUCOZYME FROM LYSOZYME WAS ACHIEVED AND THIS PREPARATION HAD NO EFFECT ON THE MUCOPEPTIDE. LEUCOZYME A BETA STOPS OXYGEN UPTAKE AND CAUSES CYTOPLASMIC DESTRUCTION OF NONPATHOGENIC STAPHYLOCOCCI. AVIRULENT AND VIRULENT CHARACTERISTICS WERE OBSERVED IN OTHER TEST ANIMALS WHICH WERE SUBJECTED TO INFECTIONS OF PNEUMOCOCCI: ESCHERICHIA COLI: SHIGELLA: AND SALMONELLA STRAINS. THE ATTACK POINT OF PLAKIN ON THE CHAIN OF RESPIRATORY SYSTEM OF B. MEGATERIUM WAS CLARIFIED. PHOSPHOLIPIDS OF CYTOPLASMIC MEMBRANE WERE THE MAIN ATTACK POINT OF PLAKIN AND IT WAS THE CAUSE OF THE DAMAGE OF THE ELECTRON TRANSFERRING SYSTEM.
AD-292 263 DIV. 16

BALLOONS
PILOTS

LOW LEVEL BALLOON PILOT TRAINING FLIGHTS.
AD-292 980 DIV. 23

BAND-PASS FILTERS

A LOW-NOISE E-BAND AMPLIFIER WITH AN ELECTRICALLY-TUNABLE BANDPASS FILTER EMPLOYING YIG SPHERES.
AD-292 794 DIV. 8

BEACHES
NEW JERSEY

MAPPING OF THE HORSESHOE COVE SHORELINE: SANDY HOOK: NEW JERSEY.
AD-292 156 DIV. 2

BEAMS

ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
AD-292 118 DIV. 25

BEARINGS
LUBRICANTS

HIGH TEMPERATURE EFFECTS ON PHYSICAL PROPERTIES OF 4 BEARING GREASES.
AD-292 280 DIV. 14

BEHAVIOR

POWER: STRATEGY: AND THE FORMATION OF COALITIONS IN TRIADS UNDER FOUR INCENTIVE CONDITIONS.
AD-292 105 DIV. 28

EFFECTS OF IPRONIAZID ON AVOIDANCE BEHAVIOR IN THE SLEEP DEPRIVED RAT.
AD-292 710 DIV. 28

BEHAVIOR
IONIZATION

THE EFFECTS OF AIR IONS ON HUMAN PERFORMANCE DURING PSYCHOMOTOR TASKS.
AD-293 170 DIV. 28

BENZALDEHYDES

IR SPECTRAL DATA FOR 41 ALDEHYDES: SPECTRA-STRUCTURE CORRELATION: ALIPHATIC: AROMATIC: ALPHA-OLEFINIC: BENZALDEHYDES.
AD-292 248 DIV. 4

BENZENES

SYNTHESIS OF 1000F STABLE BASE FLUIDS. HEXAFLUOROBENZENE. 1:4-DIBROMOTETRAFLUOROBENZENE.
AD-291 973 DIV. 14

SYNTHESIS OF 1000 F STABLE BASE FLUIDS WITH PERFLUOROPOLYAROMATIC STRUCTURES SUCH AS THE PERFLUOROPOLYPHENYL ETHERS.
AD-292 095 DIV. 14

FREQUENCY ASSIGNMENTS 1/650 TO 1/250 CM SPECTRAL REGION FOR 279 BENZENE DERIVATIVES: RAMAN SPECTRA: FOR IR SPECTRA: RING DEFORMATION.
AD-292 627 DIV. 4

BESSEL FUNCTIONS

AN INVESTIGATION OF THE APPLICATION OF NON-LINEAR MODELING WITH FUNCTIONS OF A SPECIAL TYPE
AD-292 106 DIV. 15

BIBLIOGRAPHY

THE ABSTRACTS OF FIVE REPORTS ON CONTROL SYSTEM THEORY IN THE AREAS OF OPTIMUM CONTROL SYSTEMS: MULTIDIMENSIONAL SYSTEMS AND ADAPTIVE SYSTEMS.
AD-292 279 DIV. 7

A COMPILATION OF HANDBOOKS CATALOGED BY ASTIA FROM 1952 THROUGH 1962.
AD-292 750 DIV. 32

A REVIEW OF SOME APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING.
AD-293 679 DIV. 15

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AD-293 409 DIV. 16

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CLOSTRIDIUM BOTULINUM

BIBLIOGRAPHY ON BOTULISM AND CLOSTRIDIUM BOTULINUM.
AD-293 455 DIV. 16

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CUBA

A BIBLIOGRAPHY OF RELEVANT LITERATURE CONCERNING EVENTS IN CUBA FROM 1953 TO 1962.
AD-292 900 DIV. 32

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MAGNETOHYDRODYNAMICS

BIBLIOGRAPHY OF RUSSIAN LITERATURE IN THE FIELD OF MAGNETOHYDRODYNAMICS: 1958 TO 1962. MAIN SOURCES INCLUDED INTERNATIONAL AEROSPACE ABSTRACTS: MONTHLY INDEX TO RUSSIAN ACCESSIONS: ENGINEERING INDEX: TECHNICAL TRANSLATIONS: NASA ANNOUNCEMENTS: AND MONTHLY CATALOGUE OF U.S. GOVERNMENT PUBLICATIONS.
AD-293 273 DIV. 9

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AD-292 152 DIV. 14

ABSTRACTS OF ARTICLES ON HIGH STRENGTH ALLOYS: LIGHT METALS: NONMETALLICS: AND REFRACTORY METALS.
AD-293 270 DIV. 17

BIBLIOGRAPHY
MATHEMATICS

REPORT ON RESEARCH DONE UNDER GRANT ON PSEUDO-CONCAVE AND -CONVEX COMPLEX SPACES: INCLUDES BIBLIOGRAPHY AND PERSONNEL INVOLVED.
AD-292 904 DIV. 15

BIBLIOGRAPHY
METALORGANIC COMPOUNDS

BIBLIOGRAPHY OF 181 REFERENCES FROM SOVIET LITERATURE ON ORGANOMETALLIC COMPOUNDS.
AD-293 466 DIV. 4

***BIBLIOGRAPHY**
Q FEVER

BIBLIOGRAPHY ON Q-FEVER VIRUS AND HOSTS.
AD-293 213 DIV. 16

***BIOLOGICAL STAINS**
FLUORESCENT DYES

FLUORESCENT STAINING OF SIX SPECIES OF MICROORGANISMS BY 16 FLUOROCHROMES HAS BEEN STUDIED WHEN SUSPENSIONS OF THE MICROORGANISMS WERE ADDED TO FLUOROCHROME SOLUTIONS AND WHEN THE SUSPENSIONS WERE ADDED TO SLIDES PRETREATED WITH THE FLUOROCHROMES.
AD-293 207 DIV. 16

***BIOPHYSICS**

DESIGN AND DEVELOPMENT OF REGENERATIVE CO2 SORBERS: MOLECULAR SIEVES AND AMINE SORPTION SYSTEMS; THEORETICAL CONSIDERATIONS OF MASS TRANSFER.
AD-293 224 DIV. 26

***BIOPHYSICS**
INSTRUMENTATION

GALVANIC SKIN RESPONSE INSTRUMENTATION BASED ON SOLID STATE DESIGN PRINCIPLE.
AD-292 490 DIV. 16

***BIRDS**
MIGRATION AREA

DISPLACEMENT AND SURVIVAL DATA OF SEVERAL GENETIC STOCKS OF MIGRATORY BIRDS.
AD-292 790 DIV. 16

***BLACKBODY RADIATION**

STELLAR SIMULATOR FEASIBILITY STUDY.
AD-292 440 DIV. 2

***BLANKETS**
HEATERS

SERVICEABILITY TEST OF HEATER BLANKET FOR THE HS-1 ROCKET.
AD-293 698 DIV. 22

***BLAST**

SYMPOSIUM ON EQUATION OF STATE FOR EARTH MATERIALS. ABSTRACTS OF THE PAPERS ARE PRESENTED. IN THIS TEXT EQUATION OF STATE MEANS BEHAVIOR OF A MATERIAL UNDER GIVEN STATES AND BOUNDARY CONDITIONS REGARDLESS OF INTENSITY OF THE APPLIED STRESS.
AD-292 620 DIV. 13

AN ECONOMICAL, ARCH-SHAPED SHELTER, UTILIZING PNEUMATICALLY-PLACED MORTAR, PROVIDES PROTECTION FOR 100 MEN AND AN OVERPRESSURE OF 100 PSI.
AD-292 730 DIV. 13

***BLOOD**

REACTIONS OF HEMOGLOBIN AND STEADY-STATES IN THE HUMAN RESPIRATORY SYSTEM: AN INVESTIGATION USING MATHEMATICAL MODELS AND AN ELECTRONIC COMPUTER.
AD-292 068 DIV. 16

***BLOOD**
VISCOSITY

STUDIES ON BLOOD VISCOSITY AT LOW SHEAR RATES: THE EFFECTS OF RBC CELL CONCENTRATION AND OF HIGH AND LOW MOLECULAR FRACTIONS OF DEXTRAN.
AD-292 993 DIV. 16

***BLOOD CIRCULATION**

REFINEMENTS IN PHOTOELECTRIC PLETHYSMOGRAPHY: PART II. UTILIZATION OF PHOTOCONDUCTIVE DEVICES SHOULD BE LIMITED TO RECORDINGS OF VOLUME PULSES IF SUBJECT TO RAPID TEMPERATURE CHANGES. PHOTOTUBES ARE MORE SUITABLE FOR CLIMATE CHAMBER STUDIES WHEN CHANGES IN BLOOD CONTENT OF TISSUE ARE DESIRED.
AD-293 136 DIV. 16

***BLOOD PLASMA**
TRAUMATIC SHOCK

SHELF-STORED, POOLED HUMAN PLASMA (6 MO. AT ROOM TEMPERATURE) AND RECONSTITUTED LYOPHILIZED HUMAN PLASMA ARE MORE EFFECTIVE IN THE THERAPY OF RAT TOURNIQUET TRAUMA SHOCK THAN AGED OR FROZEN RAT PLASMA, FRESHLY COLLECTED RAT OR HUMAN PLASMA, AND HUMAN ALBUMIN. A FILTER SYSTEM FOR STERILIZATION OF PLASMA IS DESCRIBED.
AD-291 949 DIV. 16

***BLOOD PLATELETS**
SURVIVAL

THE HALF-LIFE OF DOG AND HUMAN PLATELETS HAS BEEN SHOWN TO BE 1.4 AND 2.8 DAYS RESPECTIVELY. THE DESTRUCTION IS DUE TO IN VIVO COAGULATION, BUT NEITHER AMINOAMIP NOR HEPARIN IS ABLE TO STOP THE PROCESS COMPLETELY.
AD-293 169 DIV. 16

***BLOOD PRESSURE**

THE VASOMOTOR CENTERS IN THE HYPOTHALAMIC REGIONS WERE MAPPED BY HISTOLOGICAL EXAMINATION OF THE TISSUES FOLLOWING STIMULATION OF VARIOUS AREAS WITH A 4-MIL-POLE ELECTRODE AND CAUTERIZING THE POINTS AT WHICH A PRESSOR OR DEPRESSOR RESPONSE OF MORE THAN 30 MM HG IS PRODUCED. EFFECT ON HEART RATE, RESPIRATION, AND STOMACH CONTRACTION WERE ALSO NOTED.
AD-292 262 DIV. 16

***BLOOD VOLUME**

REFINEMENTS IN PHOTOELECTRIC PLETHYSMOGRAPHY: PART II. UTILIZATION OF PHOTOCONDUCTIVE DEVICES SHOULD BE LIMITED TO RECORDINGS OF VOLUME PULSES IF SUBJECT TO RAPID TEMPERATURE CHANGES. PHOTOTUBES ARE MORE SUITABLE FOR CLIMATE CHAMBER STUDIES WHEN CHANGES IN BLOOD CONTENT OF TISSUE ARE DESIRED.
AD-293 136 DIV. 16

***BLUNT BODIES**

THE FLOW OF GAS NEAR THE STAGNATION POINT OF A BLUNT BODY WITH A FINITE RATE OF EXCITATION OF VIBRATIONAL DEGREES OF FREEDOM.
AD-292 197 DIV. 9

***BLUNT BODIES**
DRAG

PRESSURE DRAG REDUCTION AS A RESULT OF OPTIMIZING AN AFTERBODY SHAPE.
AD-293 408 DIV. 12

***BLUNT BODIES**
HYPERSONIC FLOW

MATHEMATICAL CALCULATION OF INVISCID HYPERSONIC FLOW IN THE STAGNATION POINT REGION OF A BLUNT BODY IN HYPERSONIC FLOW.
AD-293 651 DIV. 9

***BLUNT BODIES**
SUPERSONIC FLOW

FLIGHT-SONIC BOOM: A NEW METHOD OF STUDY.
AD-292 458 DIV. 9

***BOILERS**

A DIRECT-CONTACT HEAT EXCHANGER.
AD-292 932 DIV. 13

***BOILING WATER REACTORS**

A COMPILATION OF RADIOACTIVE FALLOUT FROM A NUCLEAR REACTOR IN GREENLAND.
AD-293 669 DIV. 20

***BOMB HANDLING VEHICLES**

OPERATIONAL TESTS AND EVALUATION OF A BOMB LOADING DEVICE.
AD-292 093 DIV. 1

***BONDING**

GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS. WETTING OF RESIN ON GLASS WAS GREATER THAN WATER ON GLASS, AS INDICATED BY THE CAPTIVE BUBBLE TECHNIQUE. DETAILED INFORMATION ON SIZE AND SHAPE OF AN AIR VOID NEAR THE GLASS SURFACE IS PRESENTED.
AD-292 256 DIV. 18

***BOTULISM**
BIBLIOGRAPHY

BIBLIOGRAPHY ON BOTULISM AND CLOSTRIDIUM BOTULINUM.
AD-293 455 DIV. 16

***BOUNDARY LAYER**

THE TURBULENT BOUNDARY LAYER OF A GAS IN A PERMEABLE WALL.
AD-292 180 DIV. 9

***BRAIN**
ELECTRICAL PROPERTIES

A TECHNIQUE FOR WIRELESS TRANSMISSION OF SINGLE NERVE CELL ACTIVITY FROM THE BRAIN OF UNRESTRAINED, FREELY-MOVING CATS AND THE EFFECT OF VARIOUS STIMULI, MOTOR ACTIVITY, AND ANESTHESIA ON THE FIRING PATTERNS RECORDED WITH IT.
AD-292 972 DIV. 16

***BROADBAND**

ELECTRONIC BROADBANDING OF ANTENNAS: ADMITTANCE OF A RECTANGULAR SLOT BACKED BY A RECTANGULAR CAVITY, SLOT ANTENNA IMPEDANCE MEASUREMENTS, AND HALLEN'S METHOD IN THE PROBLEM OF A CAVITY BACKED RECTANGULAR SLOT ANTENNA ARE SOME OF ANTENNA-TECHNIQUES DISCUSSED.
AD-293 276 DIV. 8

***BROADBAND PROBES**

CONTAINING RESEARCH ON BROAD-BAND SOLID-STATE LIMITERS FOR PROTECTING RECEIVERS.
AD-292 133 DIV. 25

***BUBBLES**

MIGRATION OF EXPLOSION BUBBLES IN A ROTATING TEST TANK. EQUATIONS OF MOTION. SPRAY MOTION. BUBBLE AND GRAVITY MIGRATION. SIDEWARD MIGRATION. UPWARD MIGRATION DISTORTION.
AD-293 494 DIV. 22

***CABLE ASSEMBLIES**

THE FEASIBILITY OF USING LONG TETHERLINES TO AID IN ORBITAL DOCKING OR TO RECOVER ASTRONAUTS OR MATERIALS OUTSIDE A VEHICLE. REELING IN A LINE A FEW HUNDRED FEET IN LENGTH CAN RESULT IN FORCES WHICH WOULD BE INTOLERABLE TO AN ASTRONAUT.
AD-293 222 DIV. 26

***CADMIUM COMPOUNDS**

HIGH-TEMPERATURE VAPOR DEPOSITION GROWTH OF SINGLE CRYSTALS OF SN (IV) AND CD OXIDES.
AD-292 118 DIV. 25

***CADMIUM PLATING**

PERFORMANCE TESTS OF BONDS MADE WITH SCOTCH-WELD AF31 ADHESIVE ON CD-PLATED 4130 STEEL, TREATED WITH IRIDITE 99 CONVERSION COATING.
AD-292 293 DIV. 14

***CALCITE**

X-RAY DIFFRACTION ANALYSIS OF CALCIUM CARBONATE, DATA CONCERNING FACTORS AFFECTING QUANTITATIVE ANALYSIS OF CALCITE AND ARAGONITE IN DEEP-SEA CORES BY USE OF X-RAY DIFFRACTION. EFFECT OF GRINDING. STANDARD CURVE FOR PERCENTAGE ESTIMATION OF CALCITE IN SEDIMENT SAMPLES.
AD-293 293 DIV. 30

***CALCIUM COMPOUNDS**

X-RAY DIFFRACTION ANALYSIS OF CALCIUM CARBONATE, DATA CONCERNING FACTORS AFFECTING QUANTITATIVE ANALYSIS OF CALCITE AND ARAGONITE IN DEEP-SEA CORES BY USE OF X-RAY DIFFRACTION. EFFECT OF GRINDING. STANDARD CURVE FOR PERCENTAGE ESTIMATION OF CALCITE IN SEDIMENT SAMPLES.
AD-293 293 DIV. 30

***CALIBRATION**

EFFECTS OF ADSORBED FILMS OF CAMPHOR AND THYMOL IN KINETICS OF THE TI(IV)-TI(III) ELECTRODE REACTION.
AD-293 463 DIV. 6

***CALORIMETERS**

ASSESSMENT OF ERRORS INVOLVED IN THICK-FILM HEAT TRANSFER MEASUREMENTS. CALIBRATION PROCEDURE FOR THE THICK-FILM GAGE CONSTANT P.CL/(R ALPHA SUB 0)).
AD-292 355 DIV. 30

***CAMPHORS**

EFFECTS OF ADSORBED FILMS OF CAMPHOR AND THYMOL IN KINETICS OF THE TI(IV)-TI(III) ELECTRODE REACTION.
AD-293 463 DIV. 6

***CANADA**

SOME PHYSICAL AND CHEMICAL MEASUREMENTS ON ICE WITH REFERENCE TO THE HARD HUNT CORES: OXYGEN ANALYSIS, GAS PRESSURE, STRENGTH, AND TRITIUM DIFFUSION.
AD-292 089 DIV. 2

***CARBOHYDRATES**
METABOLISM

THE MECHANISM BY WHICH THE CONCOMITANT METABOLISM OF CARBOHYDRATES INFLUENCES THE OXIDATION OF FATTY ACIDS HAS BEEN INVESTIGATED IN LIVER SLICES FROM NORMAL AND COLD-FASTED RATS.
AD-293 198 DIV. 16

***CARBON DIOXIDE**

DESIGN AND DEVELOPMENT OF REGENERATIVE CO2

SORPERS: MOLECULAR SIEVES AND A620 SORPTION SYSTEMS: THEORETICAL CONSIDERATIONS OF MASS TRANSFER.
AD-293 224 DIV. 20

*CARBONATES

X-RAY DIFFRACTION ANALYSIS OF CALCIUM CARBONATE. DATA CONCERNING FACTORS AFFECTING QUANTITATIVE ANALYSIS OF CALCITE AND ARAGONITE IN DEEP-SEA CORES BY USE OF X-RAY DIFFRACTION. EFFECT OF GRINDING. STANDARD CURVE FOR PERCENTAGE ESTIMATION OF CALCITE IN SEDIMENT SAMPLES.
AD-293 293 DIV. 30

*CARGO SHIPS

DETERMINATION OF DISPLACEMENT OF DRY CARGO SHIPS IN THE EARLY STAGES OF DESIGN.
AD-292 140 DIV. 91

*CARGO VEHICLES

SUITABILITY OF THE 1000-GAL ROLLING LIQUID TRANSPORTER FOR ARMY USE UNDER ARCTIC CONDITIONS.
AD-292 320 DIV. 11

*CAROTENOIDS
OXIDATION

CAROTENOIDS FROM MARINE ALGAE WERE SHOWN TO UNDERGO ANTOXIDATION IN SEA WATER RATHER THAN BREAKDOWN BY BACTERIA. PROTEOLYTIC BREAKDOWN OF CHROMOPROTEINS BY MARINE BACTERIA AND ENZYMES WAS STUDIED AND ADAPTED TO A METHOD OF ISOLATION FOR MARINE BACTERIA.
AD-292 003 DIV. 16

*CARTRIDGES
AIRCRAFT AMMUNITION

FABRICATION AND EVALUATION OF FINAL ENGINEERING LOT NO. FA-X3M-2580 OF T-23E1: BALL, 30MM CARTRIDGE.
AD-293 181 DIV. 22

*CARTRIDGES
CRIMPING TOOLS

HYDRAULIC CRIMPING STATION FOR V-AND-O 20-MM AUTOMATIC CARTRIDGE ASSEMBLY MACHINE.
AD-292 927 DIV. 22

*CASTINGS

INFLUENCE OF MOLD WALL THICKNESS ON THE QUALITY OF INGOTS CAST FROM NI-BASED ALLOYS: DENSITY: HOLDING: CRACKING: ULTRASONIC MONITORING.
AD-292 612 DIV. 17

EFFECT OF PROCESS ANNEALING ON THE STRUCTURE AND PROPERTIES OF CAST #1 MICROSTRUCTURE: MECHANICAL PROPERTIES: BRITTLENESS.
AD-292 617 DIV. 17

*CATALYSIS

H GENERATION FROM LIGHT PETROLEUM DISTILLATE FOR GENERATING ELECTRICITY H2-O2 FUEL CELL SUBMARINE SERVICE: EQUIPMENT AND PROCESS DESIGN.
AD-292 252 DIV. 7

*CATHODES (ELECTROLYTIC CELL)
NITROBENZENES

ELECTROREDUCTION OF AROMATIC NITRO COMPOUNDS IN AQUEOUS SOLUTIONS. PART I. REDUCTION OF NITROBENZENES IN ACID LIQUID AMMONIA SOLUTIONS.
AD-293 446 DIV. 4

*CATHODES (ELECTRON TUBES)
TANTALUM

BOMBARDMENT OF TANTALUM CATHODE BY ELECTRON GUN: PHYSICAL AND ELECTRICAL PHENOMENA.
AD-292 108 DIV. 25

*CERAMIC FIBERS

AL2O3 WHISKERS FOR REINFORCING 80-20 NI-CR ALLOY AND IRON: TENSILE PROPERTIES: BONDING: W-REDUCED FE: FIBER LOADING.
AD-291 917 DIV. 14

*CERAMIC MATERIALS

REFRACTORY OXIDES: MECHANISTIC UNDERSTANDING OF ELECTRICAL PROPERTIES OF VARIOUS METAL OXIDES. STUDIES ARE BEING MADE OF PURE ZIRCONIA AND ZIRCONIA STABILIZED WITH CALCIA: INFLUENCE OF CATION-CATION INTERACTION ON CONDUCTIVITY IN CHROMIA-ALUMINA SOLID SOLUTIONS.
AD-293 487 DIV. 14

REFRACTORY OXIDES. MEASUREMENT OF ELECTRICAL CONDUCTIVITY, THERMOELECTRIC POWER, TRANSFERENCE NUMBERS AS A FUNCTION OF TEMPERATURE AND OXYGEN PARTIAL PRESSURE.
AD-293 488 DIV. 14

*CEREBRAL CORTEX
VISUAL PERCEPTION

CONDITIONED RESPONSES AND THE NEUROPHYSIOLOGICAL RELATIONSHIPS.
AD-293 101 DIV. 16

*CERENKOV RADIATION

A THEORETICAL ANALYSIS OF CERENKOV POWER GENERATION FOR VARIOUS BEAM GEOMETRIES AND SOME EXPERIMENTAL TECHNIQUES.
AD-292 966 DIV. 5

*CESIUM

INSTRUMENTATION FOR MEASUREMENT OF VAPOR PRESSURE OF ALKALI METALS (CS, K, NA, LI) FROM 10 TO THE -5TH POWER TO 10 TO THE -2ND POWER MM HG.
AD-292 316 DIV. 4

*CHEMICAL BONDS
MATHEMATICAL ANALYSIS

THE INTERNAL FIELD AND THE ADDITIVITY OF BOND POLARIZABILITIES.
AD-293 436 DIV. 4

*CHEMICAL ELEMENTS

ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE. GLOBULAR STAR CLUSTERS. ROLF-RAYET STAR OF GAMMA 2 VELORUM. H/HE RATIO IN HD 94964. EMISSION NEBULOSITIES IN SMALL AND LARGE MAGELLANIC CLOUDS. SPECTRUM OF NGC 7009.
AD-292 680 DIV. 2

*CHLORINE

LIMITS OF EXPLOSION OF CL-H MIXTURES IN HCL: EFFECTS OF ADMIXTURES OF CO2, N2, O2 AND WATER VAPOR: EXPLOSIVE EXCITENS: SPARK DISCHARGE.
AD-292 616 DIV. 4

*CHOLESTEROL

FEEDING LOW PROTEIN DIETS TO GROWING CHICKS RESULTS IN ELEVATED PLASMA CHOLESTEROL AND GLYCERIDE LEVELS, BUT DOES NOT ALTER THE PLASMA LIPID PHOSPHORUS LEVELS IN THE ABSENCE OF DIETARY CHOLESTEROL. DIETARY CHOLESTEROL ELEVATED ALL PLASMA LIPID COMPONENTS REGARDLESS OF DIETARY PROTEIN LEVEL: THE INCREASES WERE GREATER IN THE LOW PROTEIN FED GROUPS. THE FATTY ACID COMPOSITION OF PLASMA AND LIVER CHOLESTEROL ESTERS WAS ALTERED BY THE DIETARY TREATMENTS EMPLOYED.
AD-292 642 DIV. 16

SERUM CHOLESTEROL WAS LOWERED WHEN QUANTITIES OF HIGHLY UNSATURATED FATS WERE INGESTED. THE CHANGES IN BLOOD CHOLESTEROL LEVEL AS RELATED TO THE DEGREE OF SATURATION OF INGESTED FAT WERE STUDIED. LACK OF MEASURED CHANGES IN THE DISPOSITION OF INGESTED STEROLS IN RATS IN THE HIGH FAT DIETS PREVENTS ANY DEFINITE CONCLUSIONS AS TO THEIR ROLES IN THE MECHANISM INVOLVED IN BLOOD CHOLESTEROL CHANGES. BLOOD CHOLESTEROL LEVELS WERE SIMILAR IN ANIMALS ON A LOW FAT DIET AND A CORN OIL DIET, WHILE LARD INTAKE WAS ASSOCIATED WITH A HIGH LEVEL OF STEROLS IN THE BLOOD.
AD-292 920 DIV. 16

*CHOLINESTERASE
TESTS

EQUIPMENT TO ADMINISTER HALOTHANE ANESTHESIA TO CONTROL MECHANICAL VENTILATION, EXTERNAL HEART COMPRESSION TECHNIQUES, ANESTHESIA IN EMPHYSEMATOUS PATIENTS, A TEST-STRIP METHOD FOR DETERMINATION OF PLASMA CHOLINESTERASE, AND ELECTROMYOGRAPHIC STUDIES OF RESPIRATORY MUSCLES ARE DESCRIBED.
AD-293 404 DIV. 16

*CHROMATOGRAPHIC ANALYSIS
GASOLINE

DETERMINATION OF PHTHALIC ANHYDRIDE IN COATING RESINS BY GAS-LIQUID CHROMATOGRAPHIC METHOD.
AD-293 160 DIV. 14

*CHROMIUM
TITANIUM ALLOYS

EXTRUSION AND DRAWING OF TITANIUM ALLOYS.
AD-292 240 DIV. 17

*CHROMIUM ALLOYS

AL2O3 WHISKERS FOR REINFORCING 80-20 NI-CR ALLOY AND IRON: TENSILE PROPERTIES: BONDING: W-REDUCED FE: FIBER LOADING.
AD-291 917 DIV. 14

PHENIUM SEGREGATION TO GRAIN BOUNDARIES AND TWIN INTERFACES IN ALLOYS WITH GROUP VI-A METALS: ELECTRICAL RESISTANCE OF THE ALLOYS IN VARIOUS ANNEALED STATES AND OVER A RANGE OF TEMPERATURES.
AD-293 105 DIV. 17

*CHROMIUM PLATING

RADIOACTIVE ISOTOPE DILUTION METHOD DETERMINATION SULFATE CONCENTRATION IN CR PLATING SOLUTIONS: PRECIPITATION.
AD-292 281 DIV. 20

HYDROGEN RELIEF OF NICKEL AND CHROMIUM ELECTROPLATED HOT-WORK DIE STEELS - VASCOJET 1000 (H-11).
AD-292 290 DIV. 17

*CIRCULATORY SYSTEM

REFINEMENTS IN PHOTOELECTRIC PLETHYSMOGRAPHY: PART II. UTILIZATION OF PHOTOCONDUCTIVE DEVICES SHOULD BE LIMITED TO RECORDINGS OF VOLUME PULSES IF SUBJECT TO RAPID TEMPERATURE CHANGES. PHOTOTUBES ARE MORE SUITABLE FOR CLIMATE CHAMBER STUDIES WHEN CHANGES IN BLOOD CONTENT OF TISSUE ARE DESIRED.
AD-293 136 DIV. 16

*CIVIL AVIATION
FEDERAL BUDGETS

ECONOMIC CRITERIA FOR FEDERAL AVIATION AGENCY EXPENDITURES.
AD-293 107 DIV. 92

*CLOSTRIDIUM BOTULINUM

BIBLIOGRAPHY ON BOTULISM AND CLOSTRIDIUM BOTULINUM.
AD-293 455 DIV. 16

*CLOSTRIDIUM PERFRINGENS
GROWTH

A STUDY OF POSSIBLE RELATIONSHIPS BETWEEN CARBOHYDRATE DISSIMILATION OF CLOSTRIDIUM SPOROGENES.
AD-292 305 DIV. 16

*CLOUD HEIGHT INDICATORS

AN OBJECTIVE METHOD FOR FORECASTING CEILING RESTRICTIONS DUE TO GULF STRATUS AT TINKER AF BASE, OKLAHOMA.
AD-293 603 DIV. 2

*COATINGS

CONFORMAL COATINGS FOR PRINTED CIRCUIT ASSEMBLIES: EPOXY-, ACRYLIC-, AND POLYSTYRENE COATING SYSTEMS: PHYSICAL AND ELECTRICAL PROPERTIES: ADHESION AND HUMIDITY EFFECTS.
AD-293 234 DIV. 14

*COATINGS
BIBLIOGRAPHY

ABSTRACTS SELECTED REPORTS IN DEFENSE METALS INFORMATION CENTER: HEAT RESISTANT ALLOYS: METALS: REFRACTORY MATERIALS: COATINGS.
AD-291 965 DIV. 92

*COATINGS
FLUORESCENT DYES

FLUORESCENT COATINGS ON COARSE SEDIMENTS. MANY ASPECTS OF BEACH MORPHOLOGY PROVED AMENABLE TO STUDY USING COATED PARTICLES.
AD-292 155 DIV. 30

*COAXIAL CABLES

DESIGN AND DEVELOPMENT OF IMPROVED #AIRTIGHT COAXIAL CABLE: PERFORMANCE TESTS: MATERIAL DESCRIPTION AND CONSTRUCTION: VOLTAGE STANDING WAVE RATIO SLOTTED LINE MEASUREMENT EQUIPMENT.
AD-292 299 DIV. 9

STANDARDIZATION STUDY OF COAXIAL SWITCHES.
AD-292 952 DIV. 8

*COBALT COMPOUNDS

SYNTHESIS OF 1000 F STABLE BASE FLUIDS WITH PERFLUOROPOLYAROMATIC STRUCTURES SUCH AS THE PERFLUOROPOLYPHENYL ETHERS.
AD-292 095 DIV. 14

*CODING

ON PERFECT ERROR-CORRECTING CODES.
AD-292 128 DIV. 15

SYMBOLIC ADDRESS CODING BASED ON ALGOL (BOAL).
AD-292 944 DIV. 30

*COMBUSTION

ARTICLES ON COMBUSTION AT LOWERED PRESSURE AND PROBLEMS IN STABILIZATION OF A FLAME IN SINGLE-PHASE AND DOUBLE-PHASE SYSTEMS.
AD-292 190 DIV. 10

LONG LIFE CLOSED-LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
AD-293 438 DIV. 25

***COMBUSTION FUELS**

BURNING VELOCITY OF ATOMIZED FUELS DROPSI VAPORIZATION: THEORY.
AD-292 238 DIV. 10

***COMBUSTION THEORY**

SQUID PROJECT REPORT.
AD-292 674 DIV. 9

***COMBUSTION CHAMBER LINERS ELASTOMERS**

SEMI-INORGANIC ELASTOMERS - STANNOSILOXANE, TITANOSILOXANES, ALUMINOSILOXANES, ARSENOSILOXANES, STANNOSILOXANE-BASED COMPOSITIONS APPEARED SUPERIOR TO SILICONE-BASED COMPOSITIONS IN INSULATIVE CAPABILITY BUT INFERIOR TO NITRILE RUBBER-PHENOLIC RESINS AS ABLATIVE INSULATORS.
AD-293 422 DIV. 27

***COMMERCE SOCIOLOGY**

THE ROLE OF TRANSPORTATION IN RELATION TO ECONOMIC DEVELOPMENT IN THE UNITED STATES.
AD-293 124 DIV. 33

***COMMUNICATION EQUIPMENT**

COMPATIBILITY EVALUATION FOR PRINTED TAPE BUFFER EQUIPMENT: TAPE READER AND TAPE RECORDER.
AD-291 930 DIV. 8

***COMMUNICATION SYSTEMS**

COMPATIBILITY EVALUATION FOR PRINTED TAPE BUFFER EQUIPMENT: TAPE READER AND TAPE RECORDER.
AD-291 930 DIV. 8

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES, INTERCONTINENTAL AREAS AND THE SUPPORT REGIONS.
AD-291 999 DIV. 5

DEVELOPMENT OF CODED ERROR-FREE FEEDBACK COMMUNICATION SYSTEMS AND ANALYSIS OF COMMUNICATION SYSTEM PERFORMANCE.
AD-292 119 DIV. 5

A THEORETICAL ANALYSIS OF CERENKOV POWER GENERATION FOR VARIOUS BEAM GEOMETRIES AND SOME EXPERIMENTAL TECHNIQUES.
AD-292 946 DIV. 3

***COMMUNICATIONS THEORY**

DEVELOPMENT OF CODED ERROR-FREE FEEDBACK COMMUNICATION SYSTEMS AND ANALYSIS OF COMMUNICATION SYSTEM PERFORMANCE.
AD-292 119 DIV. 5

***COMMUNISM**

A BIBLIOGRAPHY OF RELEVANT LITERATURE CONCERNING EVENTS IN CUBA FROM 1959 TO 1962.
AD-292 900 DIV. 32

***COMPLEX VARIABLES**

APPROXIMATE SOLUTION FOR OBTAINING A FOURIER PAIR WHEN BOTH MODULI ARE SPECIFIED: METHOD OF STATIONARY PHASE APPLIES WHEN THE PRODUCT OF THE 'EXTENTS' OF THE MODULI IS LARGE.
AD-292 733 DIV. 15

EFFECT OF SYMMETRY ON THE LINEARIZED FORCE SYSTEM.
AD-293 631 DIV. 22

***COMPOSITE MATERIALS**

DEVELOPMENT OF COMPOSITE MATERIALS FOR USE AS STATIC AND DYNAMIC SEALS: CRYOGENIC TO 2000 F UP TO 500 PSI: RECIPROCATING SHAFTS: SEALING CABINS OF SPACESHIPS.
AD-291 986 DIV. 14

DEVELOPMENT OF FIBER-REINFORCED METALS AND ALLOYS WITH HIGH STRENGTH-TO-WEIGHT RATIOS, HIGH ELASTIC MODULI: HOT EXTRUSION: FABRICATION: AL-BE ALLOYS.
AD-293 259 DIV. 17

***COMPUTER LOGIC**

MICROMINIATURIZATION OF PORTIONS OF THE NAVYK-1 COMPUTER. FEASIBILITY OF CONSTRUCTING THE LOGIC SECTION OF THE COMPUTER WITH INTEGRATED CIRCUIT ELEMENTS.
AD-292 317 DIV. 30

STUDIES IN SPEED-INDEPENDENT LOGIC FOR CONTROL OF DIGITAL COMPUTER OPERATIONS UNDER OPERATING CONDITIONS REQUIRING INCREASED SPEED AND RELIABILITY OF COMPONENTS.
AD-293 613 DIV. 30

***COMPUTERS**

SOME PROBLEMS OF BASIC ORGANIZATION IN PROBLEM-SOLVING PROGRAMS.
AD-292 109 DIV. 30

METHODS OF APPLICATION OF COMPUTER SIMULATION OF NEUROPHYSIOLOGICAL AND SOCIAL SYSTEMS.
AD-293 241 DIV. 30

USE OF COMPUTERS AS TEACHING MACHINES IN A CLASSROOM SITUATION.
AD-293 243 DIV. 30

A DYNAMIC NETWORK FLOW ALGORITHM PROGRAMMED FOR THE IBM 7090.
AD-293 444 DIV. 30

APPLICATION OF COMPUTER TECHNIQUES TO DEVELOPMENT OF AUTOMATED SPEECH RECOGNITION SYSTEMS.
AD-293 449 DIV. 30

***COMPUTERS PROGRAMMING**

ANATOMY OF A GENERALIZED ASSEMBLY SYSTEM.
AD-292 168 DIV. 30

***CONCRETE VIBRATION ISOLATORS**

DETERMINATION OF SPECIFIC GRAVITY AND ABSORPTION CAPACITY OF LIGHTWEIGHT AGGREGATES FOR LIGHTWEIGHT CONCRETE.
AD-293 402 DIV. 14

***CONDITIONED REFLEX LEARNING**

EFFECTS OF IPRONIAZID ON AVOIDANCE BEHAVIOR IN THE SLEEP DEPRIVED RAT.
AD-292 710 DIV. 28

***CONDITIONED REFLEX LIGHT ADAPTATION**

CONDITIONED RESPONSES AND THE NEUROPHYSIOLOGICAL RELATIONSHIPS.
AD-293 101 DIV. 16

***CONDUCTIVITY**

STEADY STATE HEAT CONDUCTION IN A CIRCULAR CONE.
AD-292 961 DIV. 25

***CONFERENCES**

INTERNATIONAL SYSTEM OF UNITS OF MEASUREMENT OF PHYSICAL VALUES: THE BASIC UNITS APPEAR TO BE METER, KILOGRAM, SECOND, AMPERE, KELVIN DEGREE.
AD-292 659 DIV. 30

***CONICAL BODIES**

A NON-VISCOUS HYPERSONIC FLOW ABOUT A CIRCULAR CONE AT AN ANGLE OF ATTACK.
AD-292 958 DIV. 9

***CONICAL BODIES DRAG**

PRESSURE DRAG REDUCTION AS A RESULT OF OPTIMIZING AN AFTERBODY SHAPE.
AD-293 608 DIV. 12

***CONTINUUM MECHANICS**

DISCUSSION OF THE FOUNDATIONS OF RELATIVISTIC MECHANICS.
AD-293 435 DIV. 9

***CONTROL SIMULATORS**

EFFECT OF VARIATION OF THE DRIFT PARAMETER ON CONTROL OF A STOCHASTIC PROCESS.
AD-292 144 DIV. 28

***CONTROL SYSTEMS**

COMPUTERS AND AUTOMATION OF PRODUCTION CONTROL: AUTOMATION OF LABOR OF CONTROL ENGINEERS.
AD-292 221 DIV. 30

THE ABSTRACTS OF FIVE REPORTS ON CONTROL SYSTEM THEORY IN THE AREAS OF OPTIMUM CONTROL SYSTEMS: MULTIDIMENSIONAL SYSTEMS AND ADAPTIVE SYSTEMS.
AD-292 275 DIV. 7

THE USE OF THE TECHNIQUE OF LINEAR BOUNDS FOR APPLYING THE DIRECT METHOD OF LIAPUNOV TO A CLASS OF NONLINEAR AND TIME VARYING SYSTEMS IS STUDIED.
AD-292 302 DIV. 8

RADIATION RESISTANT FLIGHT CONTROL SYSTEMS
AD-292 307 DIV. 1

DESCRIPTION AND COMPARISON OF COMPUTER METHODS OF CIRCUIT ANALYSIS.
AD-292 321 DIV. 8

CERTAIN PROBLEMS IN THE THEORY OF MULTIVARIABLE LINEAR AUTOMATIC CONTROL SYSTEMS ARE DETERMINED AND SOLVED.
AD-292 602 DIV. 8

EFFECT OF DEGRADED OPERATIONAL MODES IN THE ACCUMULATION OF ERRORS IN NUMERICAL INTEGRATION: TRAPEZOIDAL RULE.
AD-292 678 DIV. 30

***CONTROL SYSTEMS LEARNING**

INTRODUCTION TO ONE POINT OF VIEW ON ADAPTIVE CONTROL SYSTEMS WITH LEARNING.
AD-292 796 DIV. 30

***CONTROL SYSTEMS SPACE FLIGHT**

OPTIMAL MODE SWITCHING IN TRANSFER TRAJECTORIES.
AD-293 152 DIV. 12

***CONTROLLED ATMOSPHERES**

DESIGN AND DEVELOPMENT OF REGENERATIVE CO2 SORBERS: MOLECULAR SIEVES AND AG2O SORPTION SYSTEMS: THEORETICAL CONSIDERATIONS OF MASS TRANSFER.
AD-293 226 DIV. 26

***CONVECTION PRESSURE**

AN INTERFEROMETER STUDY OF THE EFFECT OF REDUCED PRESSURE ON FREE CONVECTION FROM A VERTICAL PLATE.
AD-292 178 DIV. 25

***CORROSION**

EFFECTS OF SEVERAL CONVENTIONAL HEAT TREATMENTS ON STRESS CORROSION PROPERTIES OF 17-7 PH STAINLESS STEEL: SANDBLASTING AND SURFACE PASSIVATION: SALT SPRAY TESTS.
AD-293 098 DIV. 17

***CORROSION INHIBITION HIGH TEMPERATURE RESEARCH**

WEATHER EXPOSURE DATA FOR HIGH-TEMPERATURE COATINGS ON CHROMIUM HOT-WORK TOOL STEELS. A NICKEL-ZINC COATING WAS MOST EFFECTIVE FOR PROTECTION FROM CORROSION. PRE-EXPOSURE FROM 900 TO 1000 F FOR 150 HR.
AD-293 219 DIV. 14

***COSTS LOGISTICS**

HOW RESPONSIVE THE AIR FORCE SYSTEM SHOULD BE IN TRANSLATING CHANGING SUPPORT NEEDS INTO WORKLOADS IN BACK UP AREAS OF SUPPORT.
AD-293 431 DIV. 18

***CREEP ALUMINUM ALLOYS**

TOTAL CREEP AT 240 F FOR 100 HRS OF AL-CLAD ALUMINUM ALLOY SHEET AND EXTRUDED ALUMINUM ALLOY.
AD-293 410 DIV. 17

***CREOSOTE METABOLISM**

MARINE MICROORGANISMS WERE SHOWN TO METABOLIZE NAPHTHALENE AND PHENANTHRENE IN CREOSOTED PILING: REDUCING THE TOXICITY TO MARINE BORERS.
AD-291 905 DIV. 16

***CRIMPING TOOLS MACHINE TOOLS**

HYDRAULIC CRIMPING STATION FOR V-AND-O 20-MM AUTOMATIC CARTRIDGE ASSEMBLY MACHINE.
AD-292 927 DIV. 22

***CRYOGENICS**

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS. MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES. DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE PARAMAGNETIC SALTS. POSSIBILITY OF OBSERVING THE MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON COMPLEXES IN CDS AND CDSE.
AD-292 326 DIV. 25

***CRYSTAL FILTERS**

EFFORTS TO PRODUCE FILTER TYPE CRYSTALS FOR USE IN THE HIGH FREQUENCY BAND.
AD-292 910 DIV. 8

***CRYSTAL OSCILLATORS**

DESIGN OF 9TH OVERTONE QUARTZ CRYSTAL UNITS FROM 150 TO 200 MC.
AD-293 261 DIV. 8

***CRYSTAL STRUCTURE**
LATTICES

MASS SPECTROGRAPHIC EVIDENCE FOR DEVIATIONS FROM STOICHIOMETRY IN GASB. EVIDENCE INDICATES PROBABILITY THAT THE ACCEPTORS IN THE PUREST AVAILABLE GASB ARE LATTICE DEFECTS RATHER THAN IMPURITIES.
AD-293 248 DIV. 25

***CRYSTALLIZATION**

COLD HARDENING; RECRYSTALLIZATION OF E1617 ALLOY; FORGING; DEFORMATION; PLASTICITY; MICROSTRUCTURE.
AD-292 200 DIV. 17

CRYSTALLINITY OF POLYOLEFINS. X-RAY DETERMENATION USING COMPARISON OF CRYSTALLINE AND AMORPHOUS PEAKS.
AD-293 291 DIV. 25

***CRYSTALS**

EVALUATION OF MATRIX ELEMENTS IN CRYSTALLINE FIELD THEORY.
AD-292 081 DIV. 25

A LISTING OF REPORTS WITH ABSTRACTS; CONCERNING MAGNETIC AND STRUCTURE PROPERTIES OF SOLIDS AND SOLUTIONS.
AD-292 905 DIV. 25

***CUBA**
BIBLIOGRAPHY

A BIBLIOGRAPHY OF RELEVANT LITERATURE CONCERNING EVENTS IN CUBA FROM 1953 TO 1962.
AD-292 900 DIV. 32

***CYBERNETICS**

COMPUTERS AND AUTOMATION OF PRODUCTION CONTROL; AUTOMATION OF LABOR OF CONTROL ENGINEERS.
AD-292 221 DIV. 30

INTRODUCTION TO ONE POINT OF VIEW ON ADAPTIVE CONTROL SYSTEMS WITH LEARNING.
AD-292 796 DIV. 30

***CYLINDRICAL BODIES**

ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
AD-292 118 DIV. 25

MECHANICAL PROPERTIES AND STRENGTH OF THICK-WALLED CYLINDRICAL AND HOLLOW SPHERICAL SHELLS EXPOSED TO IRRADIATION; NEUTRON BEAMS.
AD-292 218 DIV. 25

FEASIBILITY USING MORE ECONOMICAL TEST SPECIMENS THAN STANDARD CHARPY IMPACT SPECIMENS; TRANSITION TEMPERATURES; ENERGY-FRACTURE RELATIONSHIPS; TEST METHODS.
AD-292 313 DIV. 17

***DATA PROCESSING SYSTEMS**

DEVELOPMENT OF AN AUTOMATIC DATA HEADER PROGRAMMER FOR USE WITH DOPPLER TRACKING STATIONS.
AD-291 957 DIV. 22

ACTIVITY REPORT ON AIRPORT FACILITY INCLUDING TRAFFIC CONTROL; DISPLAY SYSTEMS, LIGHTING; COMMUNICATIONS; AND LANDING SYSTEMS.
AD-292 072 DIV. 1

A DIGITAL METEOROLOGICAL DATA-ACQUISITION SYSTEM NOCTURNAL LOW LEVEL JET.
AD-292 167 DIV. 2

TAPE ADAPTATION AND CONTROL UNIT.
AD-292 341 DIV. 30

CONDENSED DESCRIPTIONS OF 327 ELECTRONIC DIGITAL COMPUTING SYSTEMS IN A SERIES OF COMPARATIVE CHARTS.
AD-293 695 DIV. 30

***DATA STORAGE SYSTEMS**

TAPE ADAPTATION AND CONTROL UNIT.
AD-292 341 DIV. 30

THE ASO EXECUTIVE ROUTINE PILOT MODEL FOR INFORMATION STORAGE AND RETRIEVAL SYSTEMS.
AD-293 106 DIV. 30

***DATA TRANSMISSION SYSTEMS**

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES; INTER-CONTINENTAL AREA; AND THE SUPPORT REGIONS.
AD-291 990 DIV. 5

DEVELOPMENT OF A HIGH FREQUENCY DIGITAL COMMUNICATION SYSTEM.
AD-292 094 DIV. 5

***DECISION MAKING**

SOME PROBLEMS OF BASIC ORGANIZATION IN PROBLEM-SOLVING PROGRAMS.
AD-292 109 DIV. 30

SOCIAL INFLUENCES ON SMALL GROUP BEHAVIOR, LEADERSHIP, JUDGMENT, AND PROPAGANDA.
AD-293 247 DIV. 32

***DECOMPOSITION**

GENERATION OF HYDROGEN FOR FUEL CELLS IN SUBMARINE PROPULSION.
AD-292 266 DIV. 4

***DEFORMATION**

DYNAMIC AND STATIC STRENGTH OF HARDENED STEEL FROM A SUB C1 TO A SUB C3 TEMPERATURES; DEFORMATION; PLASTICITY; ELASTICITY; CRYSTALLIZATION; MECHANICAL PROPERTIES; PHASE DIAGRAMS.
AD-292 239 DIV. 17

NONLINEAR THEORY OF ELASTIC SHELLS UNDR THE KIRCHHOFF HYPOTHESIS; DETERMINATION OF SUITABLE STRAIN MEASURES AND THE DERIVATION OF CONSTITUTIVE EQUATIONS.
AD-292 978 DIV. 25

***DEFORMATION**
ALUMINUM

ORIGIN OF DEFORMATION BANDS. DEVELOPMENT OF TECHNIQUES FOR THE STUDY OF THE RELATION BETWEEN ACCIDENTAL BENDINGS AND THE NUCLEATION OF DEFORMATION BANDS.
AD-292 976 DIV. 17

***DEFORMATION**
MELTING

DEFORMATION MECHANISMS IN BRANCHED POLYETHYLENE MELTS. EXPERIMENTED DETERMINATION OF POINT TO POINT RESPONSE OF THE MELTS TO STRESS.
AD-293 405 DIV. 14

***DEFORMATION**
SINGLE CRYSTALS

DISLOCATION MOBILITY IN ZN SINGLE CRYSTALS. DISLOCATION DENSITY AND CONFIGURATION WERE DETERMINED BEFORE AND AFTER STATIC LOADING AND STRESS PULSE LOADING.
AD-293 449 DIV. 25

***DENSITY**
HEIGHT FINDING

PROCEDURES AND TABLES FOR FORECASTING DENSITY ALTITUDE, THE ALTITUDE IN THE STANDARD ATMOSPHERE AT WHICH A GIVEN DENSITY OCCURS.
AD-293 168 DIV. 2

***DEPARTMENT OF DEFENSE**
PROCUREMENT

PROBLEM OF ECONOMIC EFFICIENCY IN MILITARY PROCUREMENT AND CONTRACTING.
AD-293 424 DIV. 32

***DESIGN**

NYQUIST-LIKE STABILITY CRITERIA AND SUBSTITUTION ARE USED TO ESTABLISH CONVERGENCE PROPERTIES OF LINEAR TIME-VARYING SYSTEMS; ALLOWING COMPLETE DESIGN OF ADAPTIVE CONTROL SYSTEM FROM THE REFERENCE-MODEL, WITH GUARANTEED CONVERGENCE.
AD-292 688 DIV. 15

***DETECTION**
RADIO SIGNALS

DETECTION OF A RANDOMLY DISTORTED SIGNAL IN GAUSSIAN NOISE.
AD-291 982 DIV. 6

***DETERGENTS**
SURFACE PROPERTIES

PROPOSED DETERGENCY-MICELLAR SOLUBILIZATION FUNCTION CENTERED AROUND THE CONNECTION OF THE CONSTANTS TO PHYSICOCHEMICAL FACTORS OF SOIL AND SURFACTANT. RELATIONSHIPS FOR 4- AND 5-POINT SYSTEMS.
AD-293 220 DIV. 4

***DETONATION**

DETONABILITY OF N2O AT TEMPERATURES FROM 23 TO 210 C AND PRESSURES FROM 21.4 TO 207.1 ATM IN A HIGH PRESSURE DETONATION TUBE.
AD-292 310 DIV. 22

***DETONATORS**
HAZARDS

BROADBAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
AD-292 992 DIV. 8

***DICTIONARIES**

INSTRUCTIONS FOR CODING RUSSIAN WORDS AND IDIOMS; AND A RUSSIAN-ENGLISH DICTIONARY FOR MACHINE TRANSLATION.
AD-292 706 DIV. 30

A COMPILATION OF HANDBOOKS CATALOGED BY ASTIA FROM 1952 THROUGH 1962.
AD-292 750 DIV. 32

***DIELECTRICS**

CALCULATION OF THE IONIZING INTENSITY OF THE ELECTRICAL FIELD OF A LAMINATED DIELECTRIC MADE OF CAPACITOR PAPER.
AD-292 199 DIV. 7

SUMMARY OF LONG TERM RESEARCH ON SURFACE CURRENT MEASUREMENTS; ANTENNA PATTERN SYNTHESIS; ARTIFICIAL DIELECTRIC MEDIA AND NETWORK SYNTHESIS.
AD-292 980 DIV. 8

REACTIVE ENERGY AND Q ASSOCIATED WITH ANTENNAS.
AD-292 991 DIV. 8

***DIELECTRICS**
FAILURE (MECHANICS)

FAILURE MECHANISMS IN FERROELECTRIC AND NONLINEAR DIELECTRICS; ELECTROMECHANICAL AND BREAKDOWN MEASUREMENTS; HIGH VOLTAGE PULSE GENERATOR; OXYGEN DIFFUSION; ELECTROSTRICTIVE AND ELASTIC CONSTANTS.
AD-293 266 DIV. 25

***DIET**

VOLUMES AND MAJOR MOLECULAR COMPOSITION OF GASTROINTESTINAL GAS PRODUCED IN RATS FED VARIOUS DIETS. INTESTINAL GAS VOLUMES AND COMPOSITION OF CARBON DIOXIDE AND HYDROGEN WERE REDUCED BY ANTIBIOTIC-SUPPLEMENTED DRIED SKIM MILK AND WHEAT GLUTEN DIETS. LACTOSE TO A WHEAT GLUTEN DIET INCREASED INTESTINAL VOLUMES; AND CORN DEXTRIN AND GALACTOSE DIETS ALSO PRODUCED HIGHER VOLUMES OF INTESTINAL GAS AND HIGHER H2 AND CO2 AND LOWER N2 AND O2 COMPOSITION VALUES THAN DEXTROSE AND SUCROSE DIETS.
AD-292 637 DIV. 16

***DIET**
PROTEINS

THE INTERACTION BETWEEN DIETARY PROTEIN LEVEL AND THE DAILY PERFORMANCE OF STRENUOUS WORK, WEIGHT; SKINFOLD THICKNESS; NITROGEN BALANCE; SODIUM AND POTASSIUM BALANCES; CREATININE AND URIC ACID EXCRETION; ETC. WERE MEASURED.
AD-292 347 DIV. 16

***DIFFERENCE EQUATIONS**

ISOLATE - A DIGITAL SYSTEM SOLUTION TO PLANE PARALLEL RADIATIVE TRANSFER.
AD-292 087 DIV. 30

EFFECT OF VARIATION OF THE DRIFT PARAMETER ON CONTROL OF A STOCHASTIC PROCESS.
AD-292 144 DIV. 28

INTERVAL ARITHMETIC AND AUTOMATIC ERROR ANALYSIS IN DIGITAL COMPUTING.
AD-293 442 DIV. 30

***DIFFERENTIAL CROSS SECTION**

HEAVY PARTICLE INTERACTIONS.
AD-292 078 DIV. 20

***DIFFERENTIAL EQUATIONS**

DEPENDENCE OF DELAY FUNCTIONS ON THE SOLUTION OF DIFFERENTIAL EQUATIONS.
AD-292 191 DIV. 15

A DISCUSSION OF THE DUFFING PROBLEM.
AD-292 638 DIV. 15

NYQUIST-LIKE STABILITY CRITERIA AND SUBSTITUTION ARE USED TO ESTABLISH CONVERGENCE PROPERTIES OF LINEAR TIME-VARYING SYSTEMS; ALLOWING COMPLETE DESIGN OF ADAPTIVE CONTROL SYSTEM FROM THE REFERENCE-MODEL, WITH GUARANTEED CONVERGENCE.
AD-292 688 DIV. 15

PROOF, THAT THE MINIMUM 'DISTANCE' OF N NON-NEGATIVE NUMBERS OCCURS IF THEY ARE IN A CERTAIN SYMMETRY. IS USED TO OBTAIN MINIMAL OR MAXIMAL FUNDAMENTAL FREQUENCY OF A VIBRATING STRING LOADED WITH DISCRETE WEIGHTS.
AD-292 914 DIV. 15

***DIFFERENTIAL EQUATIONS**
BOUNDARY LAYER

A THEORY FOR A PROGRAM FOR THE NUMERICAL SOLUTION OF BOUNDARY VALUE PROBLEMS OF ORDINARY DIFFERENTIAL EQUATIONS.
AD-292 968 DIV. 15

***DIFFERENTIAL GEOMETRY**
RADAR PLOTTING

TRANSPORTATION OF EARTH CO-ORDINATES IN RADAR DATA INPUT SYSTEMS.
AD-293 242 DIV. 15

***DIFFERENTIALS**

THE DISPERSION RELATION FOR WAVES PROPAGATING OBLIQUELY THROUGH A STRIP MEDIUM.
AD-292 990 DIV. 8

***DIFFRACTION**

DIFFRACTION BY A PERFECTLY CONDUCTING SEMI-INFINITE SCREEN IN AN ANISOTROPIC PLASMA.
AD-291 918 DIV. 25

***DIFFUSION**

AIR DISPERSION OF TOXIC ROCKET EXHAUST.
AD-293 432 DIV. 25

***DIGESTIVE SYSTEM**
GASES

VOLUMES AND MAJOR MOLECULAR COMPOSITION OF GASTROINTESTINAL GAS PRODUCED IN RATS FED VARIOUS DIETS. INTESTINAL GAS VOLUMES AND COMPOSITION OF CARBON DIOXIDE AND HYDROGEN WERE REDUCED BY ANTIBIOTIC-SUPPLEMENTED DRIED SKIM MILK AND WHEAT GLUTEN DIETS. LACTOSE TO A WHEAT GLUTEN DIET INCREASED INTESTINAL VOLUMES, AND CORN DEXTRIN AND GALACTOSE DIETS ALSO PRODUCED HIGHER VOLUMES OF INTESTINAL GAS AND HIGHER H2 AND CO2 AND LOWER N2 AND O2 COMPOSITION VALUES THAN DEXTROSE AND SUCROSE DIETS.
AD-292 639 DIV. 16

***DIGITAL COMPUTERS**

ISOLATE - A DIGITAL SYSTEM SOLUTION TO PLANE PARALLEL RADIATIVE TRANSFER.
AD-292 087 DIV. 30

COMPUTERS AND AUTOMATION OF PRODUCTION CONTROL: AUTOMATION OF LABOR OF CONTROL ENGINEERS.
AD-292 221 DIV. 30

MICROMINIATURIZATION OF PORTIONS OF THE NAVY-1 COMPUTER. FEASIBILITY OF CONSTRUCTING THE LOGIC SECTION OF THE COMPUTER WITH INTEGRATED CIRCUIT ELEMENTS.
AD-292 317 DIV. 30

DESCRIPTION AND COMPARISON OF COMPUTER METHODS OF CIRCUIT ANALYSIS.
AD-292 321 DIV. 8

THE UNIVERSAL AUTOMATIC DIGITAL COMPUTER, URAL-2.
AD-292 621 DIV. 30

VON NEUMANN'S ALGORITHM FOR SOLVING A MATRIX GAME INPUT ON AN IBM 7090 AND COMPARED WITH THE SIMPLEX METHOD AND "FICTITIOUS PLAY"; THE ALGORITHM IS SHOWN TO BE SENSITIVE TO DOMINANCE IN THE PAYOFF MATRIX.
AD-292 691 DIV. 15

SYMBOLIC ADDRESS CODING BASED ON ALGOL (BOA).
AD-292 944 DIV. 30

FORTRAN PROGRAM TO ESTIMATE CUMULATIVE SURVIVAL PROBABILITY AND VARIANCE.
AD-293 155 DIV. 30

INTERVAL ARITHMETIC AND AUTOMATIC ERROR ANALYSIS IN DIGITAL COMPUTING.
AD-293 442 DIV. 30

CONDENSED DESCRIPTIONS OF 327 ELECTRONIC DIGITAL COMPUTING SYSTEMS IN A SERIES OF COMPARATIVE CHARTS.
AD-293 605 DIV. 30

***DIGITAL COMPUTERS**
CONTROL SYSTEMS

STUDIES IN SPEED-INDEPENDENT LOGIC FOR CONTROL OF DIGITAL COMPUTER OPERATIONS UNDER OPERATING CONDITIONS REQUIRING INCREASED SPEED AND RELIABILITY OF COMPONENTS.
AD-293 613 DIV. 30

***DIGITAL RECORDING SYSTEMS**

TAPE ADAPTATION AND CONTROL UNIT.
AD-292 341 DIV. 30

***DIGITAL SYSTEMS**

DEVELOPMENT OF A HIGH FREQUENCY DIGITAL COMMUNICATION SYSTEM.
AD-292 094 DIV. 5

A DIGITAL METEOROLOGICAL DATA-ACQUISITION SYSTEM NOCTURNAL LOW LEVEL JET.
AD-292 167 DIV. 2

EFFECT OF DEGRADED OPERATIONAL MODES ON THE ACCUMULATION OF ERRORS IN NUMERICAL INTEGRATION: TRAPEZOIDAL RULE.
AD-292 678 DIV. 30

***DIODES**

OCTAVE-TUNABLE TUNNEL DIODE OSCILLATORS.
AD-293 216 DIV. 8

***DIODES**
SEMICONDUCTORS

HIGH Q VARACTOR DIODES. CAPACITANCE AND Q MEASUREMENTS. RELATIONSHIP BETWEEN JUNCTION CAPACITANCE AND SERIES RESISTANCE. PACKAGE DEVELOPMENT. EPITAXIAL GROWTH OF GAAS AND GAP. FABRICATION OF LARGE AREA JUNCTIONS.
AD-293 447 DIV. 8

***DIPOLE ANTENNAS**
COUPLED ANTENNAS

THE EL CAMPO SOLAR RADAR ANTENNA.
AD-292 173 DIV. 8

***DISCHARGE TUBES**

CONTINUING RESEARCH ON NONTHERMAL IONIZATION IN CESIUM AND CESIUM-HELIUM GAS DISCHARGE TUBES.
AD-293 420 DIV. 25

***DISEASE CARRIERS**
ALASKA

THE INCIDENCE AND DISTRIBUTION OF VARIOUS ACTUAL AND POTENTIAL INVERTEBRATE DISEASE VECTORS IN ALASKA.
AD-293 190 DIV. 16

***DISKS**

TEMPERATURE FIELD AND GRADIENTS IN WELDED DISK TYPE TURBINE ROTOR UNDER STARTING CONDITIONS: HEAT TRANSFER COEFFICIENTS.
AD-292 206 DIV. 27

***DISPERSION HARDENING**

DISPERSION-STRENGTHENED ALLOYS: SYSTEMS NI-TIB2 AND NI-TIC: DIFFUSION: LATTICES: DILUTE ALLOYS: INTERMETALLIC DISPERSION: ELECTRON MICROSCOPY.
AD-293 232 DIV. 17

***DISPLAY SYSTEMS**

ACTIVITY REPORT ON AIRPORT FACILITY INCLUDING TRAFFIC CONTROL, DISPLAY SYSTEMS, LIGHTING, COMMUNICATIONS, AND LANDING SYSTEMS.
AD-292 072 DIV. 1

A LUMPED PARAMETER (TRANSISTORS, RESISTORS, DIODES AND LAMPS) MODEL OF A SOLID STATE SWITCHING CIRCUIT FOR ELECTRO-LUMINESCENT DISPLAYS.
AD-292 087 DIV. 5

***DIURNAL VARIATIONS**
MASSACHUSETTS

OBSERVATIONS OF THE DIURNAL VARIATION OF 5577 A(OI) AT SACRAMENTO PEAK, NEW MEXICO AND NATICK, MASSACHUSETTS.
AD-291 931 DIV. 2

***DIURNAL VARIATIONS**
NEW MEXICO

OBSERVATIONS OF THE DIURNAL VARIATION OF 5577 A(OI) AT SACRAMENTO PEAK, NEW MEXICO AND NATICK, MASSACHUSETTS.
AD-291 931 DIV. 2

***DOCUMENTATION**

ABSTRACTS SELECTED REPORTS IN DEFENSE METALS INFORMATION CENTER: HEAT RESISTANT ALLOYS: METALS, REFRACTORY MATERIALS: COATINGS.
AD-291 965 DIV. 32

IMPLEMENTATION OF A COMPUTER SYSTEM TO SUPPORT MECHANICAL TRANSLATION, AND OTHER LINGUISTIC PROCESSES WHICH ARE POTENTIALLY APPLICABLE TO SCIENTIFIC DOCUMENTATION.
AD-292 136 DIV. 30

***DOPPLER TRACKING**

DEVELOPMENT OF AN AUTOMATIC DATA HEADER PROGRAMMER FOR USE WITH DOPPLER TRACKING STATIONS.
AD-291 957 DIV. 22

***DOSE RATE**

FLUX AND SPECTRAL MEASUREMENTS OF PRIMARY AND MODERATED NEUTRON SOURCES.
AD-292 073 DIV. 20

***DRAWING (MACHINE OOOOOOOOPROCESSING)**

EXTRUSION AND DRAWING OF TITANIUM ALLOYS.
AD-292 240 DIV. 17

***DRUGS**
REACTION (PSYCHOLOGY)

EFFECTS OF IPRONIAZID ON AVOIDANCE BEHAVIOR IN THE SLEEP DEPRIVED RAT.
AD-292 710 DIV. 28

***DRY CELLS**

LOW TEMPERATURE BA-2270/U-ALT-1 BATTERIES: IN-PLANT AND SIGNAL CORPS TESTING OF 500 BATTERIES: DISCHARGE AND ELECTROLYTE LEAKAGE TESTS: PERFORMANCE UP TO AND INCLUDING 24 MONTHS DELAY.
AD-293 425 DIV. 7

***EARTH**

ARCTIC EARTH SCIENCE INVESTIGATIONS CENTRUM SO NORTH GREENLAND TO LOCATE AND TEST A POTENTIAL EMERGENCY AIR RESCUE AIRFIELD SITE.
AD-292 749 DIV. 2

***ECOLOGY**

OBSERVATIONS ON A GROUP OF CONTEMPORARY ALASKAN ESKIMOS. THE ECOLOGICAL SETTING OF THE ULURUNIQMIUT ESKIMOS LIVING IN THE ARCTIC COASTAL VILLAGE OF WAINWRIGHT. HISTORY, RELIGION, INHABITANTS, POPULATION, CLIMATIC FACTORS, AND ECONOMIC CONDITIONS, WHICH ARE THE MAJOR ECOLOGICAL INFLUENCES, ARE PRESENTED.
AD-292 945 DIV. 10

***ECONOMICS**

USE OF GAMES IN ECONOMIC ANALYSIS.
AD-293 682 DIV. 32

***ECONOMICS**
CIVIL AVIATION

ECONOMIC CRITERIA FOR FEDERAL AVIATION AGENCY EXPENDITURES.
AD-293 107 DIV. 32

***ECONOMICS**
COSTS

MARGINAL ANALYSIS OF LOST SALES.
AD-293 246 DIV. 32

***ECONOMICS**
SIMULATION

REVIEW OF THE CURRENT STATE OF DEVELOPMENT OF SIMULATION AND GAMING WITH REFERENCE TO TWO METHODS OF APPLICATION TO ECONOMIC PROBLEMS.
AD-292 695 DIV. 30

***EJECTION SEATS**
DESIGN

THE DESIGN, DEVELOPMENT, FABRICATION, AND DELIVERY OF A PROTOTYPE SEAT MODULAR RESTRAINT, RECOVERY, AND SURVIVAL SYSTEM. PROBLEM AREAS AND RESULTS OBTAINED FROM PROGRAM. PHYSIOLOGICAL TOLERANCE.
AD-292 761 DIV. 1

***ELASTIC SCATTERING**

HEAVY PARTICLE INTERACTIONS.
AD-292 078 DIV. 20

***ELASTIC SHELLS**

NONLINEAR THEORY OF ELASTIC SHELLS UNDR THE KIRCHHOFF HYPOTHESIS: DETERMINATION OF SUITABLE STRAIN MEASURES AND THE DERIVATION OF CONSTITUTIVE EQUATIONS.
AD-292 978 DIV. 25

***ELASTICITY**

PARAMETRIC ACCURACY STUDY OF A DECAY-DAMPING RELATIONSHIP.
AD-292 369 DIV. 9

***ELASTICITY**
MATHEMATICAL ANALYSIS

ELASTIC PROPERTIES RESEARCH. INFLUENCE OF GRAIN BOUNDARY RELAXATION ON ELASTICITY OF POLYCRYSTALLINE AGGREGATES; MODULUS COMPENSATED ACTIVATION ENERGY FOR CREEP; ELASTIC AND PLASTIC PROPERTIES OF PURE POLYCRYSTALLINE COPPER; EFFECT OF FERROMAGNETISM ON ELASTIC AND PLASTIC PROPERTIES OF FE, CO AND NI.
AD-292 798 DIV. 17

***ELASTOMERS**

COMPATIBILITY OF O-RING SEAL MATERIAL WITH ETHYLENE GLYCOL AT TEMPERATURES FROM 150 TO 350 F.
AD-292 396 DIV. 14

SEMI-INORGANIC ELASTOMERS - SYNNOSILOXANE, TITANOSILOXANES, ALUMINOSILOXANES, ARSENOSILOXANES, STANNOSILOXANE-BASED COMPOSITIONS APPEARED SUPERIOR TO SILICONE-BASED COMPOSITIONS IN INSULATIVE CAPABILITY BUT INFERIOR TO NITRILE RUBBER-PHENOLIC RESINS AS ABLATIVE INSULATORS.
AD-293 422 DIV. 27

***ELASTOMERS**
SYNTHESIS

SYNTHESIS OF NITROSOFLUOROALKYL COMPOUNDS FROM NITROSYL CHLORIDE AND FLUOROOLEFINS; FLUOROCHLORO- AND FLUOROBROMOOLEFINS TO PRODUCE FUEL AND OIL RESISTANT ELASTOMERS. ETHYLENE, PROPYLENE, AD BUTYLENE AND BUTADIENE DERIVATIVES WERE USED.
AD-291 971 DIV. 4

NITROSOALLYL POLYFLUORIDES SYNTHESIZED TO DEVELOP UNSATURATED FLUORO-OLEFIN COMPOUNDS WHICH ARE OIL AND FUEL RESISTANT AND RETAIN ELASTICITY AT LOW TEMPERATURES.
AD-292 098 DIV. 4

***ELECTRIC ARCS**

CHARACTERISTICS OF A 400 KC ELECTRIC ARC.
AD-292 336 DIV. 9

A TRANSPIRATION-COOLED WALL STABILIZED D-C ARC.
AD-292 337 DIV. 9

EXTENSION OR RETRACTION OF THE OUTER EVELOPE PERMITS INVESTIGATION OF VARIOUS ANODE CONFIGURATIONS IN AN ELECTRIC ARC.
AD-292 338 DIV. 25

***ELECTRIC CABLES**
PRINTED CIRCUITS

PRINTED CABLES AND CONNECTORS.
AD-293 629 DIV. 8

***ELECTRIC CONNECTORS**

DEVELOPMENT OF COMPLIANT BRIDGING TECHNIQUES, SUBSTRATE FABRICATION AND INTERCONNECTION DEPOSITION FOR MICROMINIATURIZED CIRCUITS.
AD-293 146 DIV. 8

A TRIAXIAL PULSE CONNECTOR MATERIAL AND THE METHOD OF MANUFACTURE OF THE PRIMARY INSULATOR.
AD-293 200 DIV. 7

***ELECTRIC CONNECTORS**
PRINTED CIRCUITS

PRINTED CABLES AND CONNECTORS.
AD-293 629 DIV. 8

***ELECTRIC CURRENTS**
BIOLOGY

A REPORT FROM AN ALL-UNION (USSR) SYMPOSIUM DEALING WITH THE USE OF CYBERNETICS IN MEDICINE, BIOLOGY, AND PHYSIOLOGY. THE BIOELECTROSTIMULATOR WAS USED AS A NEW METHOD OF DIAGNOSIS AND STIMULATION OF THE NEUROMUSCULAR APPARATUS OF A HUMAN BEING THROUGH THE USE OF AMPLIFIED BIOPOTENTIAL OSCILLATIONS.
AD-292 610 DIV. 16

***ELECTRIC DETONATORS**

TWO-CONDUCTOR LOW-PASS TRANSMISSION LINE WHICH ALLOWS A DESIRED AUDIO CONTROL SIGNAL TO BE DELIVERED TO AN ELECTROEXPLOSIVE DEVICE.
AD-292 110 DIV. 22

***ELECTRIC DISCHARGES**

EQUIPMENT FOR REMOVING SINTER FROM SURFACE OF STEEL HOT-ROLLED BAND (METAL TAPES) WITH ABRASIVE MATERIAL; METALLIC BATH WITH SPARK DISCHARGES.
AD-292 207 DIV. 26

CHARACTERISTICS OF A 400 KC ELECTRIC ARC.
AD-292 336 DIV. 9

A TRANSPIRATION-COOLED WALL STABILIZED D-C ARC.
AD-292 337 DIV. 9

EXTENSION OR RETRACTION OF THE OUTER EVELOPE PERMITS INVESTIGATION OF VARIOUS ANODE CONFIGURATIONS IN AN ELECTRIC ARC.
AD-292 338 DIV. 25

HIGH-POWER GAS DISCHARGE LAMPS.
AD-292 619 DIV. 25

ELECTROHYDRAULIC EFFECT; APPLICATION MINING; HYDRAULIC PRESSURE; HIGH VOLTAGE PULSED DISCHARGE; ELECTRIC PIERCING OF LIQUIDS.
AD-292 662 DIV. 17

***ELECTRIC FILTERS**

PROPERTIES OF SOME ALL-POLE TRANSFER FUNCTION OF FILTERS.
AD-292 193 DIV. 8

***ELECTRIC FUZES**

DC AND RF MEASUREMENTS ARE USED TO EVALUATE HOT-WIRE-BRIDGED, ELECTRO-EXPLOSIVE DEVICES.
AD-292 075 DIV. 8

***ELECTRIC IGNITERS**

TWO-CONDUCTOR LOW-PASS TRANSMISSION LINE WHICH ALLOWS A DESIRED AUDIO CONTROL SIGNAL TO BE DELIVERED TO AN ELECTROEXPLOSIVE DEVICE.
AD-292 110 DIV. 22

HERO SUPPORTING STUDIES.
AD-293 476 DIV. 22

***ELECTRIC IGNITERS**
ARTILLERY

FEASIBILITY STUDY OF AN EXPLODING BRIDGE-WIRE PROPELLANT IGNITION SYSTEM FOR A CLOSED BREECH WEAPON SYSTEM.
AD-292 083 DIV. 22

***ELECTRIC POWER PRODUCTION**

CONTINUING RESEARCH ON STATIC ENERGY CONVERSION, INCLUDING MEASUREMENT OF NERNST COEFFICIENTS
AD-293 408 DIV. 7

FEASIBILITY OF A NUCLEAR SPACE POWER SYSTEM THAT UTILIZES A THERMIONIC RADIATION; AN ELECTRICALLY HEATED REFRACTORY METAL (CB-ZR) TEST LOOP; REFRACTORY METAL PROPERTIES; LIQUID LITHIUM.
AD-293 493 DIV. 7

***ELECTRIC PRIMERS**

DC AND RF MEASUREMENTS ARE USED TO EVALUATE HOT-WIRE-BRIDGED, ELECTRO-EXPLOSIVE DEVICES.
AD-292 075 DIV. 8

***ELECTRIC PROPULSION**
ION ROCKETS

MANUFACTURING PROCESSES INVOLVED IN PRODUCTION OF POROUS TUNGSTEN EMITTERS FOR USE IN AN ATMOSPHERE OF CESIUM IN DEVELOPMENT OF ELECTRIC POPULSION SYSTEM.
AD-292 257 DIV. 27

***ELECTRIC PROPULSION**
NUCLEAR REACTIONS

CONTROLLED FUSION PROPULSION FOR SPACE APPLICATIONS - SYMPOSIA PAPER.
AD-293 493 DIV. 12

***ELECTRIC SWITCHES**

STANDARDIZATION STUDY OF COAXIAL SWITCHES.
AD-292 952 DIV. 8

***ELECTRICAL EQUIPMENT**

DESIGN AND DEVELOPMENT OF IMPROVED WATERTIGHT COAXIAL CABLE; PERFORMANCE TESTS; MATERIAL DESCRIPTION AND CONSTRUCTION; VOLTAGE STANDING WAVE RATIO SLOTTED LINE MEASUREMENT EQUIPMENT.
AD-292 299 DIV. 7

***ELECTRICAL EQUIPMENT**
RELIABILITY

RELIABILITY, MAINTAINABILITY, AND TESTS OF RADAR EQUIPMENT AND COMPONENTS.
AD-292 936 DIV. 6

***ELECTRICAL NETWORKS**

REALIZABILITY CONDITIONS OF SINGLE-CONTACT NETWORKS.
AD-293 103 DIV. 8

***ELECTRICAL NETWORKS**
SYNTHESIS

TRANSISTOR RC NETWORK SYNTHESIS.
AD-293 460 DIV. 8

***ELECTRICAL PROPERTIES**
ALLOYS

PHONON SCATTERING TO GRAIN BOUNDARIES AND TWIN INTERFACES IN ALLOYS WITH GROUP VI-A METALS; ELECTRICAL RESISTANCE OF THE ALLOYS IN VARIOUS ANNEALED STATES AND OVER A RANGE OF TEMPERATURES.
AD-293 105 DIV. 17

***ELECTROACOUSTIC TRANSDUCERS**

CONTINUING RESEARCH ON PIEZOELECTRIC CERAMIC TRANSDUCER TESTED IN SOUND FIELDS UP TO 140 DB.
AD-292 318 DIV. 8

***ELECTRODES**

CALCULATION OF A 3-PHASE HEATER WITH ANGULAR ELECTRODES.
AD-292 203 DIV. 7

EFFECTS OF ADSORBED FILMS OF CAMPHOR AND THYMOL ON KINETICS OF THE TI(IV)-TI(III) ELECTRODE REACTION.
AD-293 463 DIV. 4

***ELECTRODES**
MATERIALS

FUEL CELL ELECTRODE MATERIALS. RAW MATERIAL SELECTION INFLUENCES POLARIZATION BUT IS NOT A SINGLE CONTROLLING FACTOR. AVAILABLE DATA INDICATES THAT AN INTERRELATIONSHIP OF POROSITY, AVERAGE PORE VOLUME, AND PERMEABILITY CONTRIBUTES TO ELECTRODE FUEL CELL BEHAVIOR.
AD-293 490 DIV. 7

***ELECTRODES**
PHOTOGRAPHIC LENSES

SOLID ELECTROLYTE FUEL CELLS.
AD-292 066 DIV. 7

***ELECTROEROSIVE MACHINING**

METHOD AND EQUIPMENT FOR FINISHING METAL SURFACES BY VIBRO-ARC SURFACING.
AD-292 235 DIV. 26

***ELECTROLYTES**
RESISTANCE

SOLID ELECTROLYTE FUEL CELLS.
AD-292 066 DIV. 7

***ELECTROMAGNETIC EFFECTS**
TISSUES (BIOLOGY)

TEMPERATURE RISE CURVES AT VARIOUS DEPTHS OF TISSUE, TISSUE PATHOLOGY, PARTICULARLY IN THE MOUSE REPRODUCTIVE SYSTEM, PRODUCED BY 3-CM ELECTROMAGNETIC WAVES.
AD-292 205 DIV. 16

***ELECTROMAGNETIC FIELDS**

A STUDY OF THE INTERACTION BETWEEN ELECTROMAGNETIC FIELDS AND PLASMAS IS PRESENTED.
AD-292 714 DIV. 25

***ELECTROMAGNETIC FUZES**
MICROSCOPY

THE ROLE OF ELECTRON MICROSCOPY IN OBSERVATIONS OF RADIATION DAMAGE.
AD-293 690 DIV. 20

***ELECTROMAGNETIC WAVES**

A SOLUTION FOR ELF PROPAGATION IN THE EARTH-IONOSPHERE CAVITY BOUNDED BY AN INHOMOGENEOUS ANISOTROPIC IONOSPHERIC MEDIUM.
AD-292 166 DIV. 25

NONLINEAR EFFECTS IN A MAGNETOACTIVE PLASMA; FREQUENCY DEPENDENCE OF CROSS MODULATION (LUXEMBURG-GORKOV-SKIY EFFECT); RESONANCE OF CROSS MODULATION AT GYROFREQUENCY.
AD-292 235 DIV. 25

THE DISPERSION RELATION FOR WAVES PROPAGATING OBLIQUELY THROUGH A STRIP MEDIUM.
AD-292 990 DIV. 8

REACTIVE ENERGY AND Q ASSOCIATED WITH ANTENNAS.
AD-292 991 DIV. 8

***ELECTROMAGNETIC WAVES**
ABSORPTION

BROADBAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
AD-292 992 DIV. 8

***ELECTROMAGNETIC WAVES**
TRANSMISSION

THE TRANSMISSION OF AUDIO-FREQUENCY ELECTROMAGNETIC WAVES THROUGH THE TERRESTRIAL IONOSPHERE IN THE MAGNETO-IONIC MODE.
AD-292 716 DIV. 25

***ELECTRON BEAMS**
HIGH TEMPERATURE RESEARCH

BOMBARDMENT OF TANTALUM CATHODE BY ELECTRON GUN: PHYSICAL AND ELECTRICAL PHENOMENA.
AD-292 108 DIV. 25

***ELECTRON BEAMS**
WELDING

FABRICATION AND TESTING OF SEVEN CONVOLUTION ELECTRON BEAM WELDED SERPENTINE LIGHTWEIGHT WAVEGUIDES.
AD-293 612 DIV. 8

***ELECTRON BOMBARDMENT**
ELECTRON GUNS

BOMBARDMENT OF TANTALUM CATHODE BY ELECTRON GUN: PHYSICAL AND ELECTRICAL PHENOMENA.
AD-292 108 DIV. 25

***ELECTRON CAPTURE**

HEAVY PARTICLE INTERACTIONS.
AD-292 078 DIV. 20

***ELECTRON TUBES**
COOLING

ADVANCED TECHNIQUES: VORTEX FLOW FOR COOLING VERY HIGH POWER MICROWAVE TUBES.
AD-292 065 DIV. 8

***ELECTRONIC CIRCUITS**

THE ELECTRICAL PROPERTIES OF RING-PLANE CIRCUITS FOR USE WITH HIGH-PERVEANCE BEAMS IN TRAVELING WAVE TUBES CAPABLE OF OPERATION ABOVE 35 KMC.
AD-293 096 DIV. 8

***ELECTRONIC CIRCUITS**
ANALYSIS

DESCRIPTION AND COMPARISON OF COMPUTER METHODS OF CIRCUIT ANALYSIS.
AD-292 321 DIV. 8

***ELECTRONIC EQUIPMENT**

FEASIBILITY OF PROVIDING FIELD INSTRUMENTATION CAPABLE OF SHOWING THE RATE OF DEGRADATION OF PERFORMANCE OF AN INDIVIDUAL ELECTRONIC EQUIPMENT EXPRESSED IN TERMS OF OPERATING TIME REMAINING UNTIL FAILURE OCCURS.
AD-292 141 DIV. 8

RADIOELECTRONICS - APPLICATIONS TO SPACESHIPS AND SPACE FLIGHT. USSR TRANSLATION.
AD-292 237 DIV. 8

***ELECTRONICS**

PRINCIPLE FOR PROGRAMMED AUTOMATIC CONTROL OF A TELESCOPE: DETERMINING ATMOSPHERIC TRANSPARENCIES. USSR TRANSLATION.
AD-292 201 DIV. 8

RADIOELECTRONICS - APPLICATIONS TO SPACESHIPS AND SPACE FLIGHT. USSR TRANSLATION.
AD-292 237 DIV. 8

***ELECTRONS**

OBSERVATIONS OF COLLECTIVE PHENOMENA IN PLASMA ARE STUDIED.
AD-292 797 DIV. 25

***ELLIPSOIDS**

THE CONDITIONS OF EQUILIBRIUM AND STABILITY OF A CHARGED, SPATIALLY RESTRICTED PLASMA
AD-292 185 DIV. 25

THE THEORY OF NEWTONIAN GRAVITATION: TENSORS OF HIGHER RANK. THE SUPER-POTENTIALS OF HOMOGENEOUS ELLIPSOIDS AND THE POINT OF BIFURCATION ALONG THE SEQUENCE OF THE JACOBI ELLIPSOIDS ARE STUDIED.
AD-292 284 DIV. 2

***ENAMEL COATINGS**

TOTAL REFLECTANCE SPECTRUM FOR WEATHERED F-106 ENAMEL PAINT ON ALUMINUM ALLOY PANELS.
AD-292 279 DIV. 14

***ENCEPHALITIS VIRUSES**
TICKS

AN EXPERIMENTAL INVESTIGATION OF DERMACENTOR SILVARUM TICKS AS CARRIERS OF VERNAL ENCEPHALITIS VIRUS IS PRESENTED.
AD-293 481 DIV. 16

***ENCYCLOPEDIAS**

A COMPILATION OF HANDBOOKS CATALOGED BY ASTIA FROM 1952 THROUGH 1962.
AD-292 750 DIV. 32

***ENGINE CYLINDERS**

FIELD TESTS OF HYDRAULIC FLUID, NONPETROLEUM BASE, AUTOMOTIVE: HYDRAULIC CYLINDERS AND BRAKES: STORAGE: STABILITY.
AD-292 322 DIV. 14

***ENZYMES**
BIOSYNTHESIS

A MUTANT BACTERIA WITH THE ABILITY TO MAKE UNUSUALLY LARGE QUANTITIES OF THE ENZYME BETA-GALACTOSIDASE.
AD-293 280 DIV. 16

***ENZYMES**
INHIBITION

FORCE-AREA STUDY OF MIXED FILMS OF CATALASE AND OVOMUCOID: WILHELMY FILM BALANCE MEASUREMENTS: MOLECULAR AREA DETERMINATIONS.
AD-292 922 DIV. 4

***EPOXY RESINS**

QUALIFICATION TESTS OF GLASS TEXTILE LAMINATES FIBERGLAS CLOTH NO. 181 VOLAN A: EPON 829 EPOXY RESIN: APCO 320 CATALYST: TENSILE: COMPRESSION: FLEXURAL TESTS.
AD-292 382 DIV. 14

RESISTANCE OF VARIOUS ORGANIC MATERIALS TO SKYDROL 500 HYDRAULIC FLUID IMMERSION.
AD-292 285 DIV. 14

***EQUATIONS**

TENSOR ANALYSIS TO SOLVE EQUATIONS OF MOTION, ENERGY, AND CONTINUITY AS AN APPLICATION OF FLUID MECHANICS.
AD-292 177 DIV. 9

***EQUATIONS OF STATE**

SYMPOSIUM ON EQUATION OF STATE FOR EARTH MATERIALS. ABSTRACTS OF THE PAPERS ARE PRESENTED. IN THIS TEXT EQUATION OF STATE MEANS BEHAVIOR OF A MATERIAL UNDER GIVEN STATES AND BOUNDARY CONDITIONS REGARDLESS OF INTENSITY OF THE APPLIED STRESS.
AD-292 629 DIV. 13

***ERRORS**

AN INSTANCE OF AMPLITUDE ERROR DISCRETIZATION OF SIGNALS.
AD-292 607 DIV. 8

ASYMPTOTIC POWER SERIES EXPANSION OF INTEGRAL INVOLVING LARGE PARAMETERS AND SEPARATION OF ALL SINGULARITIES FROM THE SADDLE POINT.
AD-292 997 DIV. 15

***ERRORS**
ANALYSIS

INTERVAL ARITHMETIC AND AUTOMATIC ERROR ANALYSIS IN DIGITAL COMPUTING.
AD-293 442 DIV. 30

***ESKIMOS**

OBSERVATIONS OF A GROUP OF CONTEMPORARY ALASKAN ESKIMOS. THE ECOLOGICAL SETTING OF THE ULUPUNIKAMIUT ESKIMOS LIVING IN THE ARCTIC COASTAL VILLAGE OF WAINWRIGHT. HISTORY, RELIGION, INHABITANTS, POPULATION, CLIMATIC FACTORS, AND ECONOMIC CONDITIONS, WHICH ARE THE MAJOR ECOLOGICAL INFLUENCES, ARE PRESENTED.
AD-292 945 DIV. 16

***ETHYLENES**
POLYMERS

DEFORMATION MECHANISMS IN BRANCHED POLYETHYLENE MELTS. EXPERIMENTED DETERMINATION OF POINT TO POINT RESPONSE OF THE MELTS TO STRESS.
AD-293 408 DIV. 14

***EXHAUST GASES**

AIR DISPERSION OF TOXIC ROCKET EXHAUST.
AD-293 432 DIV. 25

***EXPLOSIONS**

METHOD FORGING BY EXPLOSION: EXPLOSIVE FORMING: SHEET METALS AND ALLOYS.
AD-292 655 DIV. 26

***EXPLOSIVE FORMING**

METHOD FORGING BY EXPLOSION: EXPLOSIVE FORMING: SHEET METALS AND ALLOYS.
AD-292 655 DIV. 26

***EXPLOSIVE GASES**

LIMITS OF EXPLOSION OF CL-H MIXTURES IN HCL: EFFECTS OF ADMIXTURES OF CO2, N2, O2 AND WATER VAPOR: EXPLOSIVE EXCITENS: SPARK DISCHARGE.
AD-292 616 DIV. 4

***EXPLOSIVES**
HEAT TOLERANCE

DEVELOPMENT OF TECHNIQUES TO DETECT AND DETERMINE THE EFFECTS OF HEAT ON SELECTED PRIMARY EXPLOSIVES.
AD-291 906 DIV. 22

***EXPOSURE**

LIVER SLICES EXPOSED TO 0 TO 2 DEGREES C FROM 24 TO 48 HOURS SHOWED A GREATLY DEPRESSED CAPACITY TO SYNTHESIZE FATTY ACIDS FROM CARBOXYL LABELED ACETATE. THE CONVERSION TO CHOLESTEROL WAS NOT AFFECTED. ADDITION OF GLUCOSE TO CHOLESTEROL SYNTHESIS PRESENTED A MARKED INCREASE OF CHOLESTEROGENESIS WHEN THE COLD-EXPOSED ANIMAL WAS FLOODED WITH CARBOHYDRATE.
AD-293 174 DIV. 16

THE ADDITION OF GLUCOSE TO THE INCUBATION MEDIUM REVERSED THE CHANGES IN HEPATIC ACETATE METABOLISM THAT OCCURRED WITH COLD-EXPOSURE OR FASTING OR BOTH. THE EFFECTS OF INTERMEDIATES OF CARBOHYDRATE METABOLISM WERE STUDIED, BY USING SODIUM PYRUVATE. CHANGES WERE OBSERVED IN THE AMOUNT OF ACETATE-C14 INCORPORATED INTO CARBON FOURTEEN OXIDE (C14O2) FATTY ACID AND CHOLESTEROL BY METABOLIZING LIVER SLICES.
AD-293 175 DIV. 16

***EXPOSURE**
LABORATORY ANIMALS

EXPERIMENTS WERE PERFORMED TO DETERMINE WHETHER ADAPTATION TO COLD ALTERS THE EFFECTS OF MORPHINE ON THE MINUTE VOLUME AND OXYGEN CONSUMPTION OF THE UNANESTHETIZED RAT: AND ON THE MEDIAN EFFECTIVE ANALGETIC AND THE MEDIAN LETHAL DOSES OF MORPHINE IN THE MICE.
AD-293 134 DIV. 16

STUDIES ON THE REGULATION OF LIPOGENESIS. PRELIMINARY EVIDENCE WAS REPORTED THAT LIPOGENESIS MAY BE REGULATED TO A GREAT EXTENT BY THE GENERATION OF AN INHIBITOR.
AD-293 139 DIV. 16

EFFECTS OF SHORT CHAIN FATTY ACIDS ON ACETATE UTILIZATION COMPARISON OF HEPATIC METABOLISM OF BUTYRATE AND ACETATE. EFFECTS OF PROPIONATE AND ACETATE ON BUTYRATE 1-C14 METABOLISM AND ACETATE METABOLISM IN LIVER SLICES PREPARED FROM CHRONIC COLD EXPOSED RATS.
AD-293 181 DIV. 16

METABOLISM IN LIVER SLICES PREPARED FROM CHRONIC COLD-EXPOSED RATS IS PRESENTED. FATTY ACID METABOLISM OF COLD FASTED RATS: CARBOHYDRATE METABOLISM: INHIBITORY EFFECTS OF SHORT CHAIN FATTY ACID ON GLUCOSE METABOLISM: PROPIONATE: SUCCINATE: AND FASTING AND BLOOD SUGAR.
AD-293 182 DIV. 16

DETAILED STUDY OF THE RELATIONSHIP BETWEEN HEPATIC CARBOHYDRATE CONTENT AND ACETATE OXIDATION WAS INVESTIGATED. CARBOHYDRATE CONTENT DRASTICALLY REDUCED FASTING RATS BACK AT 25 DEGREES C AND ZERO DEGREES CENTIGRADE.
AD-293 183 DIV. 16

THE ABILITY OF LIVER TO SYNTHESIZE FATTY ACIDS FROM ACETATES WAS MARKEDLY DEPRESSED. A CAUSAL RELATIONSHIP BETWEEN THE DEPRESSED LIPOGENESIS AND LOW LIVER CARBOHYDRATE WAS APPARENT. THE OXIDATION OF ACETATE SHOWN BY C(1)+1O(2) PRODUCTION WAS NOT AFFECTED BY EXPOSURE FOR 1 TO 2 DAYS. THE EFFECT OF LOW ENVIRONMENTAL TEMPERATURES ON HEPATIC CHOLESTEROL SYNTHESIS IS COMPLEX.
AD-293 184 DIV. 16

***EXPOSURE**
METABOLISM

PERFECTION OF TECHNIQUES IN THE STUDY OF METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD. EXPERIMENTS WERE PERFORMED ON LIVER SLICES FROM 'HALE' WISTAR RATS, 3 1/2 TO 6 MONTHS, FED ON A STANDARD SYNTHETIC DIET. OBSERVATIONS OF PHOSPHATE VERSUS BICARBONATE BUFFER, TIME COURSE OF ACETATE METABOLISM, CHOLESTEROL SYNTHESIS, FATTY ACID SYNTHESIS, AND THE EFFECT OF ACETATE CONCENTRATION ON THE PATTERN AND QUANTITY OF ACETATE METABOLISM ARE PRESENTED.
AD-293 173 DIV. 16

STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD.
AD-293 176 DIV. 16

EFFECT OF PYRUVATE ON ACETATE METABOLISM: EFFECT OF UNLABELED ACETATE ON HEPATIC C14 ACETATE METABOLISM: EFFECT OF KREBS CYCLE

INTERMEDIATE ON ACETATE METABOLISM: EFFECT OF NACL ON HEPATIC ACETATE METABOLISM: COMPARISON OF EFFECT OF GLUCOSE AND PYRUVATE ON ACETATE METABOLISM: EFFECT OF BUTYRATE ON ACETATE METABOLISM: LIPOGENESIS IN LIVER HOMOGENATE SYSTEM.
AD-293 177 DIV. 16

THE EFFECT OF PYRUVATE ON THE OXIDATION OF ACETATE AND ON THE CONVERSION OF ACETATE INTO FATTY ACIDS IN RAT LIVER IS DISCUSSED. OBSERVATIONS OF BUTYRATE EFFECT ON ACETATE AND GLUCOSE METABOLISM ARE PRESENTED.
AD-293 178 DIV. 16

EFFECT OF SHORT CHAIN FATTY ACIDS ON HEPATIC ACETATE METABOLISM AND EFFECT OF KREBS CYCLE INTERMEDIATES ON HEPATIC ACETATE METABOLISM ARE PRESENTED.
AD-293 179 DIV. 16

EFFECTS OF KREBS CYCLE INTERMEDIATES AND SHORT CHAIN FATTY ACIDS ON HEPATIC ACID METABOLISM WERE INVESTIGATED.
AD-293 180 DIV. 16

THE EFFECT OF PROLONGED COLD EXPOSURE ON THE IN VITRO RESPIRATION AND ANAEROBIC GLYCOLYSIS OF RAT LIVER.
AD-293 187 DIV. 16

***EXTERIOR BALLISTICS**

EFFECT OF SYMMETRY ON THE LINEARIZED FORCE SYSTEM.
AD-293 631 DIV. 22

***FACSIMILE COMMUNICATION SYSTEMS**

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES: INTERCONTINENTAL AREAS AND THE SUPPORT REGIONS.
AD-291 998 DIV. 5

***FACTOR ANALYSIS**
ANXIETY

EFFECTS OF ANXIETY LEVEL AND MILD SITUATIONAL STRESS ON VARIOUS PSYCHOLOGICAL FUNCTIONS. THE ITS/RELATIONSHIPS AMONG THESE FUNCTIONS, ANXIETY LEVEL AND OTHER PERSONALITY VARIABLES. A MULTIVARIABLE AND FACTORIAL STUDY.
AD-292 795 DIV. 26

***FATIGUE (MECHANICS)**

FATIGUE STUDIES OF METAL CRYSTALS. SINGLE CRYSTALS OF SILVER AND ZINC WERE FATIGUED IN ALTERNATE HANDLING AT CONSTANT STRAIN AMPLITUDE OF 0.12% AND 0.2% FOR Ag AND 0.01% FOR Zn.
AD-293 471 DIV. 17

***FATS**

SERUM CHOLESTEROL WAS LOWERED WHEN QUANTITIES OF HIGHLY UNSATURATED FATS WERE INGESTED. THE CHANGES IN BLOOD CHOLESTEROL LEVEL AS RELATED TO THE DEGREE OF SATURATION OF INGESTED FAT WERE STUDIED. LACK OF MEASURED CHANGES IN THE DISPOSITION OF INGESTED STEROLS IN RATS ON THE HIGH FAT DIETS PREVENTS ANY DEFINITE CONCLUSIONS AS TO THEIR ROLES IN THE MECHANISM INVOLVED IN BLOOD CHOLESTEROL CHANGES. BLOOD CHOLESTEROL LEVELS WERE SIMILAR IN ANIMALS ON A LOW FAT DIET AND A CORN OIL DIET: WHILE LARD INTAKE WAS ASSOCIATED WITH A HIGH LEVEL OF STEROLS IN THE BLOOD.
AD-292 920 DIV. 16

***FATTY ACIDS**

FEEDING LOW PROTEIN DIETS TO GROWING CHICKS RESULTS IN ELEVATED PLASMA CHOLESTEROL AND GLYCERIDE LEVELS. BUT DOES NOT ALTER THE PLASMA LIPID PHOSPHORUS LEVELS IN THE ABSENCE OF DIETARY CHOLESTEROL. DIETARY CHOLESTEROL ELEVATED ALL PLASMA LIPID COMPONENTS REGARDLESS OF DIETARY PROTEIN LEVEL: THE INCREASES WERE GREATER IN THE LOW PROTEIN FED GROUPS. THE FATTY ACID COMPOSITION OF PLASMA AND LIVER CHOLESTEROL ESTERS WAS ALTERED BY THE DIETARY TREATMENTS EMPLOYED.
AD-292 642 DIV. 15

THE ABILITY OF LIVER TO SYNTHESIZE FATTY ACIDS FROM ACETATES WAS MARKEDLY DEPRESSED. A CAUSAL RELATIONSHIP BETWEEN THE DEPRESSED LIPOGENESIS AND LOW LIVER CARBOHYDRATE WAS APPARENT. THE OXIDATION OF ACETATE SHOWN BY C(1)#1O(2) PRODUCTION WAS NOT AFFECTED BY EXPOSURE FOR 1 TO 2 DAYS. THE EFFECT OF LOW ENVIRONMENTAL TEMPERATURES ON HEPATIC CHOLESTEROL SYNTHESIS IS COMPLEX.
AD-293 184 DIV. 16

***FATTY ACIDS**
BIOSYNTHESIS

THE EFFECT OF COLD ACCLIMATION AND FASTING ON FATTY ACID ANABOLISM AND CATABOLISM AND ON THE VITAMIN A CONTENT OF LIVER IS REPORTED.
AD-293 133 DIV. 16

***FATTY ACIDS**
METABOLISM

STUDIES ON THE REGULATION OF LIPOGENESIS. PRELIMINARY EVIDENCE WAS REPORTED THAT LIPOGENESIS MAY BE REGULATED TO A GREAT EXTENT BY THE GENERATION OF AN INHIBITOR.
AD-293 139 DIV. 16

PERFECTION OF TECHNIQUES IN THE STUDY OF METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD. EXPERIMENTS WERE PERFORMED ON LIVER SLICES FROM (MALE) #1STAR RATS: 3 1/2 TO 6 MONTHS: FED ON A STANDARD SYNTHETIC DIET. OBSERVATIONS OF PHOSPHATE VERSUS BICARBONATE BUFFER: TIME COURSE OF ACETATE METABOLISM: CHOLESTEROL SYNTHESIS: FATTY ACID SYNTHESIS: AND THE EFFECT OF ACETATE CONCENTRATION ON THE PATTERN AND QUANTITY OF ACETATE METABOLISM ARE PRESENTED.
AD-293 173 DIV. 16

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AD-293 174 DIV. 16

THE ADDITION OF GLUCOSE TO THE INCUBATION MEDIUM REVERSED THE CHANGES IN HEPATIC ACETATE METABOLISM THAT OCCURRED WITH COLD-EXPOSURE OR FASTING OR BOTH. THE EFFECTS OF INTERMEDIATES OF CARBOHYDRATE METABOLISM WERE STUDIED: BY USING SODIUM PYRUVATE. CHANGES WERE OBSERVED IN THE AMOUNT OF ACETATE-C14 INCORPORATED INTO CARBON FOURTEEN OXIDE (C14O2) FATTY ACID AND CHOLESTEROL BY METABOLIZING LIVER SLICES.
AD-293 175 DIV. 16

STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD.
AD-293 176 DIV. 16

EFFECT OF PYRUVATE ON ACETATE METABOLISM: EFFECT OF UNLABELED ACETATE ON HEPATIC C14 ACETATE METABOLISM: EFFECT OF KREBS CYCLE INTERMEDIATE ON ACETATE METABOLISM: EFFECT OF NACL ON HEPATIC ACETATE METABOLISM: COMPARISON OF EFFECT OF GLUCOSE AND PYRUVATE ON ACETATE METABOLISM: EFFECT OF BUTYRATE ON ACETATE METABOLISM: LIPOGENESIS IN LIVER HOMOGENATE SYSTEM.
AD-293 177 DIV. 16

THE EFFECT OF PYRUVATE ON THE OXIDATION OF ACETATE AND ON THE CONVERSION OF ACETATE INTO FATTY ACIDS IN RAT LIVER IS DISCUSSED. OBSERVATIONS OF BUTYRATE EFFECT ON ACETATE AND GLUCOSE METABOLISM ARE PRESENTED.
AD-293 178 DIV. 16

EFFECT OF SHORT CHAIN FATTY ACIDS ON HEPATIC ACETATE METABOLISM AND EFFECT OF KREBS CYCLE INTERMEDIATES ON HEPATIC ACETATE METABOLISM ARE PRESENTED.
AD-293 179 DIV. 16

EFFECTS OF KREBS CYCLE INTERMEDIATES AND SHORT CHAIN FATTY ACIDS ON HEPATIC ACID METABOLISM WERE INVESTIGATED.
AD-293 180 DIV. 16

EFFECTS OF SHORT CHAIN FATTY ACIDS ON ACETATE UTILIZATION COMPARISON OF HEPATIC METABOLISM OF BUTYRATE AND ACETATE. EFFECTS OF PROPIONATE AND ACETATE ON BUTYRATE 1-C14 METABOLISM AND ACETATE METABOLISM IN LIVER SLICES PREPARED FROM CHRONIC COLD EXPOSED RATS.
AD-293 181 DIV. 16

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AD-293 182 DIV. 16

DETAILED STUDY OF THE RELATIONSHIP BETWEEN HEPATIC CARBOHYDRATE CONTENT AND ACETATE OXIDATION WAS INVESTIGATED. CARBOHYDRATE CONTENT DRASTICALLY REDUCED FASTING RATS BACK AT 25 DEGREES C AND ZERO DEGREES CENTIGRADE.
AD-293 183 DIV. 16

STUDIES OF HEPATIC LIPOGENESIS IN RATS THAT HAVE LIVED IN THE COLD SEVERAL MONTHS. DEPRESSED LIPOGENESIS AND REDUCTION IN FATTY ACID SYNTHESIS WERE NOT THE RESULT OF A CURTAILED HEPATIC CARBOHYDRATE METABOLISM. OXIDATION OF ACETATE-1-C14 TO C14O(2) AND INCORPORATION OF ACETATE-1-C(14) INTO LONG CHAIN FATTY ACIDS WERE STUDIED.
AD-293 185 DIV. 16

***FATTY ACIDS**
OXIDATION

THE MECHANISM BY WHICH THE CONCOMITANT METABOLISM OF CARBOHYDRATES INFLUENCES THE OXIDATION OF FATTY ACIDS HAS BEEN INVESTIGATED IN LIVER SLICES FROM NORMAL AND COLD-FASTED RATS.
AD-293 188 DIV. 16

***FEASIBILITY STUDIES**

STELLAR SIMULATOR FEASIBILITY STUDY.
AD-292 649 DIV. 2

EVALUATION TESTS OF ELAPSED TIME INDICATORS AND DEVELOPMENT OF AN APPLICABLE SPECIFICATION.
AD-292 932 DIV. 7

TESTS ON TWO FORKLIFT TRUCKS USING 2 DIFFERENT TYPES OF TIRES.
AD-292 996 DIV. 11

***FEEDBACK**

DEVELOPMENT OF CODED ERROR-FREE FEEDBACK COMMUNICATION SYSTEMS AND ANALYSIS OF COMMUNICATION SYSTEM PERFORMANCE.
AD-292 119 DIV. 5

***FERRITES**

METHOD OF CONSTRUCTING A LINEAR FERRITE MEMORY DEVICE AND A DEVICE IMPLEMENTING THE METHOD.
AD-292 304 DIV. 30

BROADBAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
AD-292 902 DIV. 8

***FERROCENES**

IDENTIFICATION OF SEVERAL MONO-AND DI-SUBSTITUTED POLYCRYSTALLINE FERROCENES BY X-RAY DIFFRACTION ANALYSIS.
AD-292 011 DIV. 25

***FERROELECTRIC CRYSTALS**

THE PHASE SHIFT OF THE HARMONIC OUTPUT OF TRIGLYCINE SULFATE AS A FUNCTION OF THE SIGN OF POLARIZATION: THEORETICAL TREATISE SUPPORTED BY EXPERIMENTAL DATA.
AD-292 921 DIV. 25

***FERROELECTRIC MATERIALS**

THE PHASE SHIFT OF THE HARMONIC OUTPUT OF TRIGLYCINE SULFATE AS A FUNCTION OF THE SIGN OF POLARIZATION: THEORETICAL TREATISE SUPPORTED BY EXPERIMENTAL DATA.
AD-292 921 DIV. 25

***FERROELECTRIC MATERIALS**
CONDUCTIVITY

FAILURE MECHANISMS IN FERROELECTRIC AND NON-LINEAR DIELECTRICS: ELECTROMECHANICAL AND BREAKDOWN MEASUREMENTS: HIGH VOLTAGE PULSE GENERATOR: OXYGEN DIFFUSION: ELECTROSTRICTIVE AND ELASTIC CONSTANTS.
AD-293 266 DIV. 25

***FERROMAGNETIC MATERIALS**

MICROWAVE CHARACTERISTICS AND APPLICATIONS OF FERROELECTRIC CERAMICS.
AD-292 131 DIV. 8

ELASTIC PROPERTIES RESEARCH. INFLUENCE OF GRAIN BOUNDARY RELAXATION ON ELASTICITY OF POLYCRYSTALLINE AGGREGATES: MODULUS COMPENSATED ACTIVATION ENERGY FOR CREEP: ELASTIC AND PLASTIC PROPERTIES OF PURE POLYCRYSTALLINE COPPER: EFFECT OF FERROMAGNETISM ON ELASTIC AND PLASTIC PROPERTIES OF FE, CO AND NI.
AD-292 798 DIV. 17

***FIBERS**

DEVELOPMENT OF FIBER-REINFORCED METALS AND ALLOYS WITH HIGH STRENGTH-TO-WEIGHT RATIOS, HIGH ELASTIC MODULI: HOT EXTRUSION: FABRICATION: AL-BE ALLOYS.
AD-293 250 DIV. 17

***FILAMENT WOUND CONSTRUCTION**

A MAGNETOGASDYNAMIC ASYNCHRONOUS GENERATOR.
AD-292 654 DIV. 9

***FILM DRIERS**

EMPLOYMENT AND SUITABILITY TEST OF 70MM FILM PROCESSING EQUIPMENT.
AD-293 618 DIV. 24

***FILMS**

HIGH GAIN THANSMISSION SECONDARY EMISSION FILMS: IMPROVEMENT OF LOW DENSITY KCL DYNODES: EVAPORATION TECHNIQUES AND STRUCTURAL STUDIES.
AD-292 709L DIV. 8

FORCE-AREA STUDY OF MIXED FILMS OF CATALASE

AND OVOMUCOID: WILHELMY FILM BALANCE MEASUREMENTS: MOLECULAR AREA DETERMINATIONS.
AD-292 922 DIV. 4

*FINISHES

METHOD AND EQUIPMENT FOR FINISHING METAL SURFACES BY VIBRO-ARC SURFACING.
AD-292 233 DIV. 26

TOTAL REFLECTANCE SPECTRUM FOR WEATHERED F-106 ENAMEL PAINT ON ALUMINUM ALLOY PANELS.
AD-292 279 DIV. 14

*FINS
NAVAL VESSELS

EFFECT OF HULL VIBRATIONS OF VARIOUS 90# ANTI-PITCHING FIN CONFIGURATIONS.
AD-293 691 DIV. 31

*FIRE RESISTANT COATINGS

EVALUATION OF FIRE RETARDANT COATINGS ON ALUMINUM ALLOY SUBSTRATES: ALBI 90: THERMO-CLAD 90HAL: AND DUO-TEX EVALUATED UNDER FLAME AND HOT AIR IMPINGEMENT.
AD-292 278 DIV. 14

FIRE RESISTANCE TESTS ON NEOPRENE COATED FIBERGLASS CLOTH USED FOR CARGO COMPARTMENT LINERS.
AD-292 297 DIV. 14

*FISSION NEUTRONS
SIMULATION

FLUX AND SPECTRAL MEASUREMENTS OF PRIMARY AND MODERATED NEUTRON SOURCES.
AD-292 073 DIV. 20

*FLIGHT SIMULATORS

FLIGHT TRAINING OF ASTRONAUTS. A TRANSLATION FROM PRAVDA.
AD-292 600 DIV. 1

*FLUID FLOW

TENSOR ANALYSIS TO SOLVE EQUATIONS OF MOTION, ENERGY, AND CONTINUITY AS AN APPLICATION OF FLUID MECHANICS.
AD-292 177 DIV. 9

GENERATION OF A STRONGLY SWIRLING JET AND PRELIMINARY EXPERIMENTS ON THE EFFECT ON ITS DEVELOPMENT OF INITIAL SWIRL DISTRIBUTION.
AD-292 300 DIV. 9

LIMITS OF STABLE EXISTANCE OF POSITIVE GAS DISCHARGE COLUMN.
AD-292 664 DIV. 9

A DYNAMIC NETWORK FLOW ALGORITHM PROGRAMMED FOR THE IBM 7090.
AD-293 446 DIV. 20

*FLUID FLOW
GASES

THE FLOW OF GAS NEAR THE STAGNATION POINT OF A BLUNT BODY WITH A FINITE RATE OF EXCITATION OF VIBRATIONAL DEGREES OF FREEDOM.
AD-292 197 DIV. 9

*FLUID MECHANICS

TENSOR ANALYSIS TO SOLVE EQUATIONS OF MOTION, ENERGY, AND CONTINUITY AS AN APPLICATION OF FLUID MECHANICS.
AD-292 177 DIV. 9

USE OF VARIATIONAL METHODS IN PROBLEMS OF VIBRATION OF LIQUID AND LIQUID-FILLED BODIES. UNIVERSALITY AND STANDARDIZATION OF COMPUTER PROGRAMMING ARE SEEN AS POTENTIAL ADVANTAGES.
AD-292 340 DIV. 9

SQUID PROJECT REPORT.
AD-292 674 DIV. 9

A THEORY FOR OBTAINING THE LOW ORDER DISTRIBUTION FUNCTIONS AND THE THERMODYNAMIC PARAMETERS FOR NONUNIFORM EQUILIBRIUM SYSTEMS.
AD-292 937 DIV. 9

COMPOSITION FORMULAS IN GENERALIZED AXIALLY SYMMETRIC POTENTIAL THEORY.
AD-292 977 DIV. 9

*FLUIDS

SYNTHESIS OF 1000F STABLE BASE FLUIDS. HEXAFLUOROBENZENE: 1:4-DIBROMOTETRAFLUOROBENZENE.
AD-291 973 DIV. 14

SYNTHESIS OF 1000 F STABLE BASE FLUIDS WITH PERFLUOROPOLYAROMATIC STRUCTURES SUCH AS THE PERFLUOROPOLYPHENYL ETHERS.
AD-292 095 DIV. 14

*FLUORESCENT DYES

FLUORESCENT COATINGS ON COARSE SEDIMENTS. MANY ASPECTS OF BEACH MORPHOLOGY PROVED AMENABLE TO STUDY USING COATED PARTICLES.
AD-292 155 DIV. 20

INVESTIGATION OF VARIOUS FLUOROCHROMES FOR POSSIBLE DIFFERENTIATION BETWEEN ORGANIC AND INORGANIC PARTICLES AS A METHOD FOR MONITORING BW AGENTS.
AD-293 206 DIV. 3

*FLUORIDES

SYNTHESIS OF 1000 F STABLE BASE FLUIDS WITH PERFLUOROPOLYAROMATIC STRUCTURES SUCH AS THE PERFLUOROPOLYPHENYL ETHERS.
AD-292 095 DIV. 14

*FLUOROCARBONS
ETHYLENES

SYNTHESIS OF NITROSOFLUOROALKYL COMPOUNDS FROM NITROSYL CHLORIDE AND FLUOROOLEFINS. FLUOROCHLORO AND FLUOROBROMOOLEFINS TO PRODUCE FUEL AND OIL RESISTANT ELASTOMERS. ETHYLENE, PROPYLENE, AD PUTYLENE AND BUTADIENE DERIVATIVES WERE USED.
AD-291 971 DIV. 4

NITROSOALLYL POLYFLUORIDES SYNTHESIZED TO DEVELOP UNSATURATED FLUORO-OLEFIN COMPOUNDS WHICH ARE OIL AND FUEL RESISTANT AND RETAIN ELASTICITY AT LOW TEMPERATURES.
AD-292 098 DIV. 4

*FLUTTER SIMULATORS

FLIGHT FLUTTER TESTING BY SIMULATION OF THE FORCE EFFECTS OF MASS CHEATING AN APPARENT CHANGE IN THE MASS DISTRIBUTION OF AN AERODYNAMIC SURFACE.
AD-292 018 DIV. 9

*FLYING PLATFORMS
GROUND EFFECT

EFFECT OF FORWARD AIR SPEEDS ON AIR CUSHION VEHICLE PERFORMANCE.
AD-291 982 DIV. 9

*FOG

AN OBJECTIVE METHOD FOR FORECASTING NON-FRONTAL FOG AT OTIS AFB, MASSACHUSETTS.
AD-293 605 DIV. 2

*FOILS

COMPRESSIVE AND SHEAR PROPERTIES OF 2 CONFIGURATIONS OF SANDWICH CORES OF CORRUGATED AL FOIL. COMPRESSIVE AND SHEAR STRENGTH VALUES WERE LOWER FOR CROSSBANDED CORE THAN FOR HONEY-COMB CORE.
AD-293 413 DIV. 1

*FOOD
ARCTIC REGIONS

ALASKAN WILD PLANTS AS AN EMERGENCY FOOD SOURCE. DETERMINATION OF NUTRITIONAL VALUES, AND POISONOUS AND EDIBLE VARIETIES.
AD-293 131 DIV. 29

*FOOD
FREE WHEELING PROPELLERS

COMPARATIVE ACCEPTABILITY TESTS ON COOKED, SLICED FREEZE-DRIED BEEF.
AD-293 150 DIV. 29

*FOOD
PROCESSING

THE DEVELOPMENT OF BITE SIZE FOOD PIECES AND ENCAPSULATION PROCESS.
AD-292 644 DIV. 29

*FORGING

METHOD FORGING BY EXPLOSION: EXPLOSIVE FORMING SHEET METALS AND ALLOYS.
AD-292 655 DIV. 26

*FORK LIFT VEHICLES

TESTS ON TWO FORKLIFT TRUCKS USING 2 DIFFEREN TYPES OF TIRES.
AD-292 906 DIV. 11

*FOURIER ANALYSIS

APPROXIMATE SOLUTION FOR OBTAINING A FOURIER PAIR WHEN BOTH MODULI ARE SPECIFIED: METHOD OF STATIONARY PHASE APPLIES WHEN THE PRODUCT OF THE 'EXTENTS' OF THE MODULI IS LARGE.
AD-292 733 DIV. 15

*FREEZE DRYING
EFFECTIVENESS

FOLLOWING THE COURSE OF FREEZE DRYING PROCESSES AND CONTROLLING THEIR PROGRESS. METHODS UTILIZING MEASUREMENTS OF CHAMBER ATMOSPHERE, SURFACE TEMPERATURE MEASUREMENT AND MOISTURE ANALYSIS BY MEASUREMENT OF RF POWER ABSORPTION AS PROMISING FOR FULL SCALE DRYING UNITS.
AD-293 274 DIV. 29

*FREEZING POINT DEPRESSANTS

SELECTION OF CANOPY SEAL ANTI-FREEZE LUBRICANT.
AD-292 292 DIV. 14

*FREQUENCY ANALYZERS

WIDE BAND SPECTRUM SURVEILLANCE SYSTEM.
AD-292 088 DIV. 29

*FRICTION

EFFECT OF COMPOSITION AND GASEOUS MEDIA ON ANTIWEAR PROPERTIES OF PETROLEUM LUBRICATING OILS: FRICTION: OXIDATION INHIBITORS: HIGH TEMPERATURE AND PRESSURE.
AD-292 234 DIV. 14

*FUEL ADDITIVES

COMPILATION OF 147 CHEMICAL COMPOUNDS, ORGANIC AND INORGANIC, FOR POSSIBLE USE AS RAMJET ENGINE FUELS OR FUEL ADDITIVES: PHYSICAL, CHEMICAL, AND THERMODYNAMIC PROPERTIES: SELF-IGNITION.
AD-293 681 DIV. 10

*FUEL CELLS
ELECTRODES

FUEL CELL ELECTRODE MATERIALS. RAW MATERIAL SELECTION INFLUENCES POLARIZATION BUT IS NOT A SINGLE CONTROLLING FACTOR. AVAILABLE DATA INDICATES THAT AN INTERRELATIONSHIP OF POROSITY, AVERAGE PORE VOLUME, AND PERMEABILITY CONTRIBUTES TO ELECTRODE FUEL CELL BEHAVIOR.
AD-293 490 DIV. 7

*FUEL CELLS
ELECTROLYTES

SOLID ELECTROLYTE FUEL CELLS.
AD-292 064 DIV. 7

*FUEL CELLS
HIGH PASS FILTERS

H GENERATION FROM METHANOL FOR GENERATING ELECTRICITY H2-O2 FUEL CELL SUBMARINES: CATALYSIS: THERMODYNAMICS: ENTHALPY: PHYSICAL PROPERTIES: CO AND CO2 REMOVAL.
AD-292 273 DIV. 7

*FUEL CELLS
HYDROGEN

A DESIGN STUDY OF AN OPERABLE H-GENERATING PLANT BASED ON STEAM REFORMING OF METHANOL, INTENDED AS H SOURCE FOR FUEL CELLS IN SUBMARINE PROPULSION.
AD-292 134 DIV. 7

GENERATION OF HYDROGEN FOR FUEL CELLS IN SUBMARINE PROPULSION.
AD-292 246 DIV. 4

*FUEL CELLS
SUBMARINES

DESIGN STUDY FOR HYDROGEN GENERATION PLANT FOR SUBMARINE FUEL CELLS BASED ON AMMONIA DECOMPOSITION.
AD-292 139 DIV. 7

*FUEL TANKS

FAIRPRENE INTEGRAL FUEL TANK SEALING - MATERIAL - SWELLING CHARACTERISTICS WHEN IMMERSED IN 10 AVIATION FUELS AND 10 TOLUOL (AROMATIC HYDROCARBON) - AVIATION FUEL MIXTURES.
AD-292 287 DIV. 14

*FUELS

EFFECT OF CHEMICAL COMBUSTION AND ADMIXTURES ON COMBUSTION OF JET ENGINE FUELS: AIR-COOLED ENGINES: HYDROCARBONS.
AD-292 214 DIV. 10

BURNING VELOCITY OF ATOMIZED FUEL: DROPS: VAPORIZATION: THEORY.
AD-292 238 DIV. 10

COMPILATION OF 147 CHEMICAL COMPOUNDS, ORGANIC AND INORGANIC, FOR POSSIBLE USE AS RAMJET ENGINE FUELS OR FUEL ADDITIVES: PHYSICAL, CHEMICAL, AND THERMODYNAMIC PROPERTIES: SELF-IGNITION.
AD-293 681 DIV. 10

*FUNCTIONAL ANALYSIS
INTEGRATION

SOME ASPECTS OF FUNCTIONAL INTEGRATION.
AD-292 917 DIV. 15

*FUNCTIONS

ASYMPTOTIC POWER SERIES EXPANSION OF INTEGRALS INVOLVING LARGE PARAMETERS AND SEPARATION OF ALL SINGULARITIES FROM THE SADDLE POINT.
AD-292 997 DIV. 15

PROPERTIES OF SOME ALL-POLE TRANSFER FUNCTION OF FILTERS.
AD-293 153 DIV. 8

*FUZES

RELIABILITY DETERMINATION FOR GENERAL TRICHOTOMOUS SYSTEMS. A RECURSIVE TYPE OF PROCEDURE IS DEVELOPED.
AD-293 128 DIV. 22

***GASES**

ASSESSMENT OF ERRORS INVOLVED IN THICK-FILM HEAT TRANSFER MEASUREMENTS. CALIBRATION PROCEDURE FOR THE THICK-FILM GASP CONSTANT P=CL/(R ALPHA SUB O)).
AD-292 255 DIV. 30

***GALLIUM COMPOUNDS**

GROWTH OF GALLIUM ARSENIDE SINGLE CRYSTALS.
AD-292 709 DIV. 25

***GALLIUM COMPOUNDS**
MASS SPECTROSCOPY

MASS SPECTROGRAPHIC EVIDENCE FOR DEVIATIONS FROM STOICHIOMETRY IN GASB. EVIDENCE INDICATES PROBABILITY THAT THE ACCEPTORS IN THE PUREST AVAILABLE GASB ARE LATTICE DEFECTS RATHER THAN IMPURITIES.
AD-293 248 DIV. 25

***GALVANIC SKIN RESPONSE**
MEASUREMENT

GALVANIC SKIN RESPONSE INSTRUMENTATION BASED ON SOLID STATE DESIGN PRINCIPLE.
AD-292 690 DIV. 16

***GAMES THEORY**

VON NEUMANN'S ALGORITHM FOR SOLVING A MATRIX GAME INPUT ON AN IBM 7090 AND COMPARED WITH THE SIMPLEX METHOD AND **FICTITIOUS PLAY**. THE ALGORITHM IS SHOWN TO BE SENSITIVE TO DOMINANCE IN THE PAYOFF MATRIX.
AD-292 691 DIV. 15

NON-MILITARY APPLICATIONS OF OPERATIONS RESEARCH.
AD-293 671 DIV. 18

STUDIES ON BOTTLENECK PROBLEMS IN PRODUCTION PROCESSES.
AD-293 677 DIV. 15

A REVIEW OF SOME APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING.
AD-293 679 DIV. 15

***GAMES THEORY**
ECONOMIC CONDITIONS

REVIEW OF THE CURRENT STATE OF DEVELOPMENT OF SIMULATION AND GAMING WITH REFERENCE TO TWO METHODS OF APPLICATION TO ECONOMIC PROBLEMS.
AD-292 695 DIV. 30

***GAMES THEORY**
ECONOMICS

USE OF GAMES IN ECONOMIC ANALYSIS.
AD-293 682 DIV. 52

***GAS DETECTORS**

AEROSOL FLASH CAMERA AND ELECTROCHEMICAL DETECTOR FOR DETECTION AND ANALYSIS OF VX PARTICLE SIZE. MAIN COMPONENTS OF THE AEROSOL CAMERA ARE: FLASH ILLUMINATOR, OBJECTIVE LENS, IMAGE INTENSIFIER TUBE AND TV CAMERA.
AD-293 200 DIV. 3

***GAS DISCHARGES**

HIGH-POWER GAS DISCHARGE LAMPS.
AD-292 619 DIV. 25

LIMITS OF STABLE EXISTANCE OF POSITIVE GAS DISCHARGE COLUMN.
AD-292 664 DIV. 9

A STUDY OF THE INTERACTION BETWEEN ELECTROMAGNETIC FIELDS AND PLASMAS IS PRESENTED.
AD-292 716 DIV. 25

CONTINUING RESEARCH ON NONTHERMAL IONIZATION IN CESIUM AND CESIUM-HELIUM GAS DISCHARGE TUBES
AD-293 420 DIV. 25

***GAS GENERATING SYSTEMS**
FUEL CELLS

DESIGN STUDY FOR HYDROGEN GENERATION PLANT FOR SUBMARINE FUEL CELLS BASED ON AMMONIA DECOMPOSITION.
AD-292 139 DIV. 7

***GAS GENERATING SYSTEMS**
HYDROGEN

A DESIGN STUDY OF AN OPERABLE H-GENERATING PLANT BASED ON STEAM REFORMING OF METHANOL, INTENDED AS H SOURCE FOR FUEL CELLS IN SUBMARIN PROPULSION.
AD-292 134 DIV. 7

GENERATION OF HYDROGEN FOR FUEL CELLS IN SUBMARINE PROPULSION.
AD-292 246 DIV. 4

***GAS IONIZATION**

HEAVY PARTICLE INTERACTIONS.
AD-292 078 DIV. 20

DISTRIBUTION OF IONS IN THE PLASMA OF AN ARC DISCHARGE; DEPENDENCE OF DEGREE OF IONIZATION ON VAPORIZATION FROM THE ANODE OR CATHODE.
AD-292 209 DIV. 25

LONG LIFE CLOSED-LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
AD-293 438 DIV. 25

***GAS TURBINE DISKS**

TEMPERATURE FIELD AND THERMAL STRESSES OF TURBINE DISKS.
AD-292 210 DIV. 27

***GASEOUS ROCKET PROPELLANTS**

PROPELLANT PERFORMANCE AND GAS COMPOSITION HANDBOOK. PERFORMANCE TABLES OBTAINED BY PLOTTING DATA FROM MACHINE CALCULATIONS AND INTERPOLATING TO OBTAIN VACUUM SPECIFIC IMPULSES FOR INTEGRAL VALUES OF THE AREA RATIO. TABLES OF GAS COMPOSITIONS AND PERFORMANCES.
AD-293 403 DIV. 10

***GASES**

NONEQUILIBRIUM FLOW OF AIR IN NOZZLES; KINETICS OF ESTABLISHING EQUILIBRIUM BETWEEN PROGRESSIVE AND INERT DEGREES OF FREEDOM OF MOLECULES AT HIGH TEMPERATURES.
AD-292 225 DIV. 9

***GASES**
CHEMICAL ANALYSIS

DETERMINATION OF GASES (O+H) IN ALKALI METALS AND THEIR ALLOYS BY HG EXTRACTION; SAMPLE PREPARATION FOR VACUUM EXTRACTION.
AD-292 618 DIV. 4

***GASES**
OXYGEN

SOME PHYSICAL AND CHEMICAL MEASUREMENTS ON ICE WITH REFERENCE TO THE WARD HUNT CORES; OXYGEN ANALYSIS; GAS PRESSURE; STRENGTH; AND TRITIUM DIFFUSION.
AD-292 080 DIV. 2

***GASES**
SURFACES

EXPERIMENTAL MODULATED ATOMIC BEAM TECHNIQUES ADAPTED FOR THE STUDY OF GAS-SURFACE INTERACTIONS.
AD-292 963 DIV. 20

***GENERATORS**

ANALYSIS OF ENERGY LOSSES IN AN MHD GENERATOR.
AD-292 187 DIV. 8

DEVELOPMENT OF A SYNCHRONOUS MAGNETOGASDYNAMIC A-C GENERATOR.
AD-292 220 DIV. 7

H GENERATION FROM LIGHT PETROLEUM DISTILLATE FOR GENERATING ELECTRICITY H2-02 FUEL CELL SUBMARINE SERVICE; EQUIPMENT AND PROCESS DESIGN.
AD-292 252 DIV. 7

H GENERATION FROM METHANOL FOR GENERATING ELECTRICITY H2-02 FUEL CELL SUBMARINES; CATALYSIS; THERMODYNAMICS; ENTHALPY; PHYSICAL PROPERTIES; CO AND CO2 REMOVAL.
AD-292 273 DIV. 7

A MAGNETOGASDYNAMIC ASYNCHRONOUS GENERATOR.
AD-292 654 DIV. 9

CONTINUING RESEARCH ON STATIC ENERGY CONVERSION, INCLUDING MEASUREMENT OF NERNST COEFFICIENTS
AD-293 408 DIV. 7

***GENERATORS**
THEORY

THEORY OF A MAGNETOGASDYNAMIC GENERATOR.
AD-292 226 DIV. 7

***GEOLOGY**

SOME PHYSICAL AND CHEMICAL MEASUREMENTS ON ICE WITH REFERENCE TO THE WARD HUNT CORES; OXYGEN ANALYSIS; GAS PRESSURE; STRENGTH; AND TRITIUM DIFFUSION.
AD-292 080 DIV. 2

ARCTIC EARTH SCIENCE INVESTIGATIONS CENTRUM SO NORTH GREENLAND TO LOCATE AND TEST A POTENTIAL EMERGENCY AIR RESCUE AIRFIELD SITE.
AD-292 749 DIV. 2

***GEOPHYSICS**

OPERATION DEEP FREEZE; 62 MARINE GEOPHYSICAL OBSERVATIONS IN THE ANTARCTIC REGIONS.
AD-292 767 DIV. 2

***GERMANIUM**
RADIATION EFFECTS

RADIATION ENHANCED DIFFUSION IN SILICON. DESIGN OF A MICROCALORIMETER. STORED ENERGY MEASUREMENT IN IRRADIATED GE. DEFECT MOBILITY IN IRRADIATED GE.
AD-292 762 DIV. 25

***GLACIERS**

A THEORY TO EXPLAIN CATASTROPHIC GLACIER ADVANCES BASED ON A PREVIOUSLY DEVELOPED GLACIER SLIDING THEORY.
AD-292 934 DIV. 2

ELECTRICAL D-C RESISTIVITY MEASUREMENTS ON GLACIER ICE NEAR THULE, GREENLAND.
AD-292 935 DIV. 2

***GLASS RESISTORS**

NF RESISTOR FACTORIAL LOAD LIFE TEST. HERMETICALLY SEALED TIN-OXIDE RESISTORS.
AD-293 145 DIV. 8

***GLASS TEXTILES**

QUALIFICATION TESTS OF GLASS TEXTILE LAMINATES FIBERGLAS CLOTH NO. 181 VOLAN A, EPON 828 EPOXY RESIN, APCO 320 CATALYST; TENSILE, COMPRESSION, FLEXURAL TESTS.
AD-292 282 DIV. 14

QUALIFICATION TESTS FOR LAMINATES OF 181 OLAN A WITH TREVARNO F-180-11 RESIN-MECHANICAL PROPERTIES.
AD-292 286 DIV. 14

FIRE RESISTANCE TESTS ON NEOPRENE COATED FIBERGLASS CLOTH USED FOR CARGO COMPARTMENT LINERS.
AD-292 297 DIV. 14

***GLASS TEXTILES**
BONDING

GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS. WETTING OF RESIN ON GLASS WAS GREATER THAN WATER ON GLASS, AS INDICATED BY THE CAPTIVE BUBBLE TECHNIQUE. DETAILED INFORMATION ON SIZE AND SHAPE OF AN AIR VOID NEAR THE GLASS SURFACE IS PRESENTED.
AD-292 256 DIV. 14

***GLUCOSE**
METABOLISM

A STUDY OF POSSIBLE RELATIONSHIPS BETWEEN CARBOHYDRATE DISSIMILATION OF CLOSTRIDIUM SPOROGENES.
AD-292 309 DIV. 16

***GOGGLES**
MANUFACTURING METHODS

A PROCEDURE FOR PRODUCING GRADIENT DENSITY LENSES PROVIDING PROTECTION FROM ABNORMAL VISUAL STIMULI. TITANIUM AND THEN SILICON MONOXIDE ARE DEPOSITED FOLLOWING EVAPORATION FROM A TUNGSTEN SPIRAL FILAMENT UNDER VACUUM.
AD-292 974 DIV. 29

***GONIOMETERS**

RADIOGONIOMETRIC INVESTIGATIONS OF THUNDERSTORMS AND CLOUDS OF GREAT ELECTRICAL ACTIVITY.
AD-292 643 DIV. 2

***GOVERNMENT PROCUREMENT**
ECONOMICS

PROBLEM OF ECONOMIC EFFICIENCY IN MILITARY PROCUREMENT AND CONTRACTING.
AD-293 426 DIV. 32

***GRAPHITE**
HEAT TRANSFER

THERMAL CONDUCTIVITY OF MOLDED AND PYROLYTIC GRAPHITES; ANISOTROPIC SOLIDS; HIGH TEMPERATURE RESEARCH; TEST METHODS.
AD-292 326 DIV. 14

***GRAPHITE COMPOUNDS**

CONTINUING RESEARCH ON STATIC ENERGY CONVERSION, INCLUDING MEASUREMENT OF NERNST COEFFICIENTS.
AD-293 408 DIV. 7

***GRAVITY**
THEORY

THE THEORY OF NEWTONIAN GRAVITATION, TENSORS OF HIGHER RANK, THE SUPER-POTENTIALS OF HOMOGENEOUS ELLIPSOIDS AND THE POINT OF BIFURCATION

ALONG THE SEQUENCE OF THE JACOBI ELLIPSOIDS ARE STUDIED.
AD-292 256 DIV. 2

GREASES
HIGH TEMPERATURE RESEARCH

HIGH TEMPERATURE EFFECTS ON PHYSICAL PROPERTIES OF A BEARING GREASES.
AD-292 289 DIV. 14

GRINDERS

EFFECT OF THERMAL DEFORMATIONS OF MACHINE UNITS OF PRECISION GRINDING ON MACHINING ACCURACY: DEFORMATION: FRICTION: LATHE MACHINES.
AD-292 218 DIV. 26

COLD-HARDENED LAYERS OF STEEL BY GRINDING: ELECTRIC SPARK WORKING OF HEAT-RESISTANT ALLOYS ON A NI BASE: ELECTRODES.
AD-292 223 DIV. 17

GROUND CONTROLLED APPROACH RADAR

ACTIVITY REPORT ON AIRPORT FACILITY INCLUDING TRAFFIC CONTROL: DISPLAY SYSTEMS: LIGHTING: COMMUNICATIONS: AND LANDING SYSTEMS.
AD-292 072 DIV. 1

GROUP DYNAMICS
SOCIOMETRICS

POWER: STRATEGY: AND THE FORMATION OF COALITIONS IN TRIADS UNDER FOUR INCENTIVE CONDITIONS.
AD-292 109 DIV. 28

GROUPS (MATHEMATICS)

INTERVAL ARITHMETIC AND AUTOMATIC ERROR ANALYSIS IN DIGITAL COMPUTING.
AD-293 442 DIV. 30

GUIDED MISSILE ANTENNAS

A LIGHTWEIGHT: MINIATURE SYSTEM FOR AUTOMATICALLY CONTROLLING THE RADIATION PATTERN OF REACON ANTENNA ARRAYS MOUNTED ON MISSILES AND AIRCRAFT.
AD-292 641 DIV. 8

GUIDED MISSILE COMPUTERS
ERRORS

ANALYSIS OF NONCATASTROPHIC FAILURES IN DIGITAL GUIDANCE SYSTEMS.
AD-292 676 DIV. 12

GUIDED MISSILE NOSES
RE-ENTRY AERODYNAMICS

SHOCK TUNNEL STUDIES OF THE AERODYNAMICS OF ATMOSPHERIC ENTRY.
AD-292 016 DIV. 9

GUIDED MISSILE TRACKING SYSTEMS
RADIO INTERFEROMETERS

MISTRAM AUXILIARY CHECKOUT KIT TO TEST A MISSILE TRANSPONDER BEFORE LAUNCH TO VERIFY NECESSARY X-BAND MISTRAM OPERATION.
AD-293 208 DIV. 30

GUIDED MISSILE TRAJECTORIES
SIMULATION

A COMPUTER PROGRAM FOR DETERMINING RADAR TRACKING INFORMATION FROM MISSILE POSITION: VELOCITY AND ATTITUDE DATA.
AD-293 489 DIV. 30

GUIDED MISSILES (STRATEGIC)

DESCRIPTION AND COMPARISON OF COMPUTER METHODS OF CIRCUIT ANALYSIS.
AD-292 321 DIV. 8

GUIDED MISSILES (STRATEGIC)
LIQUID ROCKET PROPELLANTS

CONTROL AND INSTRUMENTATION DATA FOR THE TITAN I PROPELLANT LOADING SYSTEM.
AD-293 627 DIV. 12

GUIDED MISSILES (SURFACE-TO-SURFACE)
MOBILE

PROPOSED TESTS TO DETERMINE THE POSSIBILITY OF REMOVING OR REDUCING THE AIR CONDITIONING NOW REQUIRED BY THE PERSHING MISSILE GUIDANCE AND CONTROL COMPARTMENT.
AD-292 948 DIV. 12

GUIDED MISSILES (TACTICAL)
GROUND SUPPORT EQUIPMENT

PROPOSED TESTS TO DETERMINE THE POSSIBILITY OF REMOVING OR REDUCING THE AIR CONDITIONING NOW REQUIRED BY THE PERSHING MISSILE GUIDANCE AND CONTROL COMPARTMENT.
AD-292 948 DIV. 12

GUN FLASH
BLAST

MUZZLE BLAST MEASUREMENTS ON XM103E1: 105-MM HOWITZER.
AD-293 292 DIV. 22

GYROSCOPES
DRIFT

CALCULATION OF FACTORS AFFECTING THE ACCURACY IN DETERMINING THE DRIFT OF FLOATING INTEGRATING GYROSCOPES. TRANSLATION OF A SOVIET ARTICLE.
AD-292 222 DIV. 19

GYROSCOPES
MATHEMATICAL ANALYSIS

TRANSLATION OF SOVIET ARTICLE ENTITLED "ON THE MOVEMENTS OF A STATICALLY BALANCED GYROSCOPE IN A CARDAN JOINT: MOUNTED ON A VIBRATING BASE".
AD-292 193 DIV. 19

HAFNIUM ALLOYS

EFFECT OF VARYING TEMPERATURE: PARTIAL PRESSURE OF OXYGEN: AND ALLOY COMPOSITION ON SELECTIVE OXIDATION OF MOLYBDENUM-HAFNIUM ALLOYS IN AN ATMOSPHERE OF HYDROGEN AT 1200 AND 1400 C: USING ALLOYS WITH 1.0: 5.0: 15.0: AND 25.0 ATOM PERCENT HAFNIUM.
AD-293 158 DIV. 17

HALIDES

EFFECT IR RADIATION ON LUMINESCENCE PURE AND MIXED ASCL OR AGBR PHOSPHORS.
AD-292 665 DIV. 25

HANDBOOKS

A COMPILATION OF HANDBOOKS CATALOGED BY ASTIA FROM 1952 THROUGH 1962.
AD-292 750 DIV. 32

PROPELLANT PERFORMANCE AND GAS COMPOSITION HANDBOOK. PERFORMANCE TABLES OBTAINED BY PLOTTING DATA FROM MACHINE CALCULATIONS AND INTERPOLATING TO OBTAIN VACUUM SPECIFIC IMPULSES FOR INTEGRAL VALUES OF THE AREA RATIO. TABLES OF GAS COMPOSITIONS AND PERFORMANCES.
AD-293 483 DIV. 10

HARDENING

DYNAMIC AND STATIC STRENGTH OF HARDENED STEEL FROM A SUB C1 TO A SUB C3 TEMPERATURES: DEFORMATION: PLASTICITY: ELASTICITY: CRYSTALLIZATION: MECHANICAL PROPERTIES: PHASE DIAGRAMS.
AD-292 230 DIV. 17

HARMONIC ANALYSIS

THE PHASE SHIFT OF THE HARMONIC OUTPUT OF TRIGLYCINE SULFATE AS A FUNCTION OF THE SIGN OF POLARIZATION: THEORETICAL TREATISE SUPPORTED BY EXPERIMENTAL DATA.
AD-292 921 DIV. 25

HARMONIC OSCILLATORS

DESIGN OF 9TH OVERTONE QUARTZ CRYSTAL UNITS FROM 150 TO 200 MC.
AD-293 261 DIV. 8

HEARING

A COMPREHENSIVE REVIEW OF ALL ASPECTS OF SOUND PERCEPTION: PHYSIOLOGY: ANATOMY: NEUROLOGY: HISTOLOGY: PATHOLOGY: ETC.
AD-293 249 DIV. 16

HEART ARREST
THERAPY

IN DOGS WITH VENTRICULAR FIBRILLATION: VARIOUS COMBINATIONS OF EXTERNAL CARDIAC COMPRESSIONS AND LUNG INFLATIONS: EPINEPHRINE AND NOR EPINEPHRINE: AND PLASMA EXPANDERS WERE STUDIED. EFFECTS ON ARTERIAL PRESSURE: BLOOD FLOW: O2 AND CO2 SATURATION: AND PH VALUES: E.E.G. AND EKG WERE MEASURED. CLINICAL TESTS WERE ALSO REPORTED.
AD-293 415 DIV. 16

HEAT EXCHANGERS

A DIRECT-CONTACT HEAT EXCHANGER.
AD-292 332 DIV. 13

HEAT RESISTANT ALLOYS

EFFECT OF 1500 F EXPOSURE ON THE MECHANICAL PROPERTIES OF 10% COLD WORKED HASTELLOY R-235 NI ALLOY STRIPS.
AD-293 100 DIV. 17

HEAT RESISTANT ALLOYS
BIBLIOGRAPHY

ABSTRACTS SELECTED REPORTS IN DEFENSE METALS INFORMATION CENTER: HEAT RESISTANT ALLOYS: METALS: REFRACTORY MATERIALS: COATINGS.
AD-291 965 DIV. 32

HEAT RESISTANT ALLOYS
CASTING

INFLUENCE OF MOLD WALL THICKNESS ON THE QUALITY OF INGOTS CAST FROM NI-BASED ALLOYS: DENSITY: MOLDING: CRACKING: ULTRASONIC MONITORING.
AD-292 612 DIV. 17

HEAT RESISTANT ALLOYS
MACHINING

COLD-HARDENED LAYERS OF STEEL BY GRINDING: ELECTRIC SPARK WORKING OF HEAT-RESISTANT ALLOYS ON A NI BASE: ELECTRODES.
AD-292 223 DIV. 17

HEAT TRANSFER

THE INTERACTION OF LAMINAR BOUNDARY LAYERS SURROUNDING HORIZONTAL CYLINDERS IN FREE CONVECTION.
AD-292 353 DIV. 9

EFFECT OF VIBRATION ON HEAT TRANSFER FROM CYLINDERS IN FREE CONVECTION.
AD-292 338 DIV. 9

HEAT TRANSFER OF COMPACT CHECKERBOARD BUNDLES SUBJECTED TO A TRANSVERSE FLOW. HEAT TRANSFER TO SODIUM IN THE REGION OF SMALL PECLET NUMBERS. USSR TRANSLATION.
AD-292 657 DIV. 25

STEADY STATE HEAT CONDUCTION IN A CIRCULAR CONE.
AD-292 961 DIV. 25

HEAT TRANSFER
LIQUID METALS

HEAT TRANSFER ON THE SURFACE OF A BODY BEING MELTED IN A SUPERSONIC STREAM WITH MOLTEN METAL FED THROUGH POROUS WALL SURFACE: EFFECT OF LIQUID FILM.
AD-292 236 DIV. 25

HEAT TRANSFER
MEASUREMENT

ASSESSMENT OF ERRORS INVOLVED IN THICK-FILM HEAT TRANSFER MEASUREMENTS. CALIBRATION PROCEDURE FOR THE THICK-FILM GAGE CONSTANT P.CL/(R ALPHA SUB 0)).
AD-292 255 DIV. 30

HEAT TRANSFER
RESPIRATORY SYSTEM

A NEW INSTRUMENT: THE DIELECTRIC HYGROMETER: DESIGNED TO MEASURE WATER VAPOR IN EXPIRED AIR: IS DESCRIBED. TEMPERATURE AND WATER VAPOR CONTENT OF EXPIRED AIR WERE MEASURED IN STANDING RESTING SUBJECTS AT AMBIENT TEMPERATURES RANGING FROM 0 TO +80C.
AD-293 196 DIV. 16

HEAT TRANSFER
THERMODYNAMICS

PROPERTIES OF PLASMAS AS RELATED TO THERMAL ARC-JETS AND SELECTION OF PROPELLANTS OF AN ELECTRO-THERMAL ENGINE IN CONSIDERATION OF ENGINE PERFORMANCE AND LIFE.
AD-292 001 DIV. 25

HEAT TREATMENT

COLD-HARDENED LAYERS OF STEEL BY GRINDING: ELECTRIC SPARK WORKING OF HEAT-RESISTANT ALLOYS ON A NI BASE: ELECTRODES.
AD-292 223 DIV. 17

HEATERS

CALCULATION OF A 3-PHASE HEATER WITH ANGULAR ELECTRODES.
AD-292 205 DIV. 7

HELICOPTERS
FLIGHT PATHS

EFFECT OF HELICOPTER DYNAMICS ON STEEP INSTRUMENT APPROACHES.
AD-292 957 DIV. 1

HEMISPHERICAL SHELLS

MECHANICAL PROPERTIES AND STRENGTH OF THICK-WALLED CYLINDRICAL AND HOLLOW SPHERICAL SHELLS EXPOSED TO IRRADIATION: NEUTRON BEAMS.
AD-292 218 DIV. 25

HEMOGLOBIN
PHYSIOLOGY

REACTIONS OF HEMOGLOBIN AND STEADY-STATES IN THE HUMAN RESPIRATORY SYSTEM: AN INVESTIGATION USING MATHEMATICAL MODELS AND AN ELECTRONIC COMPUTER.
AD-292 068 DIV. 16

***HIGH FREQUENCY**

INVESTIGATION OF HIGH FREQUENCY PROPAGATION IN THE IONOSPHERE USING SATELLITE TRANSMISSIONS.
AD-293 430 DIV. 8

***HISTOLOGY**
CHEMISTRY

CYTOCHEMICAL ANALYSES OF THE FUNGUS, ASPERGILLUS NIGER REVEALED THE PRESENCE OF CHITIN AND CELLULOSE. ADAPTATION OF STANDARD CYTOCHEMICAL PROCEDURES WERE USED FOR IDENTIFICATION OF CELL WALL MATERIAL IN THE BACTERIA PSEUDOMONAS AERUGINOSA AND ESCHERICHIA COLI WHICH CONTAMINATE AVIATION FUELS. INFORMATION CONCERNING THE NATURE AND LOCATION OF THE RESISTANT SUBSTANCES WHICH MAKE UP THEIR CELL WALLS IS USEFUL IN DEVELOPMENT OF METHODS OF TREATMENT IMPORTANT TO CONTROL OF MICROORGANISMS.
AD-293 226 DIV. 16

***HONEYCOMB CORES**

MECHANICAL PROPERTIES OF AL AND REINFORCED AL HONEYCOMB CORES: DENSITY, FOIL THICKNESS, COMPRESSIVE STRENGTH, AND SHEAR CHARACTERISTICS.
AD-291 995 DIV. 17

EFFECT OF CORE THICKNESS ON SHEAR PROPERTIES OF AL HONEYCOMB CORE MATERIAL; PREPARATION OF SPECIMENS AND EVALUATION PROCEDURES.
AD-292 009 DIV. 17

CALCULATION VIBRATION DAMPING SANDWICH CONSTRUCTION FROM ELASTIC PROPERTIES, ENERGY ABSORPTION, DIRECT STRESS VIBRATION FACING MATERIALS, AND SHEAR VIBRATION CORE MATERIALS.
AD-293 412 DIV. 14

***HONEYCOMB CORES**
ALUMINUM

COMPRESSIVE AND SHEAR PROPERTIES OF 2 CONFIGURATIONS OF SANDWICH CORES OF CORRUGATED AL FOIL. COMPRESSIVE AND SHEAR STRENGTH VALUES WERE LOWER FOR CROSSBANDED CORE THAN FOR HONEYCOMB CORE.
AD-293 413 DIV. 1

***HOWITZERS**
HARBOR MODELS

PUZZLE BLAST MEASUREMENTS ON XM103E1, 105-MM HOWITZER.
AD-293 292 DIV. 22

***HUMAN ENGINEERING**
CONTROL SYSTEMS

EFFECT OF VARIATION OF THE DRIFT PARAMETER ON CONTROL OF A STOCHASTIC PROCESS.
AD-292 144 DIV. 20

***HYDRAULIC CYLINDERS**

FIELD TESTS OF HYDRAULIC FLUID, NONPETROLEUM BASE, AUTOMOTIVE; HYDRAULIC CYLINDERS AND BRAKES; STORAGE; STABILITY.
AD-292 322 DIV. 14

***HYDRAULIC FLUIDS**

FIELD TESTS OF HYDRAULIC FLUID, NONPETROLEUM BASE, AUTOMOTIVE; HYDRAULIC CYLINDERS AND BRAKES; STORAGE; STABILITY.
AD-292 322 DIV. 14

ELECTROHYDRAULIC EFFECT; APPLICATION MINING; HYDRAULIC PRESSURE; HIGH VOLTAGE PULSED DISCHARGE; ELECTRIC PIERCING OF LIQUIDS.
AD-292 662 DIV. 17

***HYDRAULIC FLUIDS**
SYNTHESIS

SYNTHESIS OF 1000F STABLE BASE FLUIDS, HEXAFLUOROBENZENE; 1,4-DIBROMOTETRAFLUOROBENZENE.
AD-291 973 DIV. 14

SYNTHESIS OF 1000 F STABLE BASE FLUIDS WITH PERFLUOROPOLYAROMATIC STRUCTURES SUCH AS THE PERFLUOROPOLYPHENYL ETHERS.
AD-292 009 DIV. 14

***HYDRAULIC PRESSURE PUMPS**

A HYDRAULIC PUMP, WITH A PRESSURE VALVE OPERATING ON THE PRINCIPLE OF AN INTERNAL COMBUSTION ENGINE.
AD-292 183 DIV. 13

***HYDROCARBONS**

EFFECT OF CHEMICAL COMBUSTION AND ADMIXTURES ON COMBUSTION OF JET ENGINE FUELS; AIR-COOLED ENGINES; HYDROCARBONS.
AD-292 314 DIV. 10

RADIATION CHEMISTRY OF PETROLEUM HYDROCARBONS; NUCLEAR RADIATION IN THE PETROLEUM-REFINING INDUSTRY; PETROCHEMICAL SYNTHESIS; RADIOLYSIS OF ALKANES; RADIATION AND THERMAL STABILITY OF AROMATIC HYDROCARBONS.
AD-292 606 DIV. 20

***HYDROCHLORIC ACID**

LIMITS OF EXPLOSION OF CL-H MIXTURES IN HCL; EFFECTS OF ADMIXTURES OF CO2, N2, O2 AND WATER VAPOR; EXPLOSIVE EXCITERS; SPARK DISCHARGE.
AD-292 616 DIV. 4

***HYDRODYNAMICS**

USE OF VARIATIONAL METHODS IN PROBLEMS OF VIBRATION OF LIQUID AND LIQUID-FILLED BODIES. UNIVERSALITY AND STANDARDIZATION OF COMPUTER PROGRAMMING ARE SEEN AS POTENTIAL ADVANTAGES.
AD-292 340 DIV. 9

***HYDRODYNAMICS**
HYDROFOILS

FREE-SURFACE WATER-TUNNEL TESTS OF AN UNCAMBERED BASE-VENTED PARABOLIC HYDROFOIL OF ASPECT RATIO ONE.
AD-292 308 DIV. 9

***HYDROFOIL BOATS**

LINEAR SUPERPOSITION PRINCIPLES ARE APPLIED TO THE IRREGULAR MOTIONS OF NON-VENTILATED, DIHEDRAL HYDROFOIL SYSTEMS IN RANDOM SEAS.
AD-292 965 DIV. 9

***HYDROFOILS**

LINEAR SUPERPOSITION PRINCIPLES ARE APPLIED TO THE IRREGULAR MOTIONS OF NON-VENTILATED, DIHEDRAL HYDROFOIL SYSTEMS IN RANDOM SEAS.
AD-292 965 DIV. 9

EXPERIMENTAL DETERMINATION OF SURFACE-PIERCING, FULLY VENTILATED HYDROFOIL STABILITY DERIVATIVES BY A FREE OSCILLATION TECHNIQUE.
AD-292 967 DIV. 9

***HYDROFOILS**
HYDRODYNAMICS

FREE-SURFACE WATER-TUNNEL TESTS OF AN UNCAMBERED BASE-VENTED PARABOLIC HYDROFOIL OF ASPECT RATIO ONE.
AD-292 308 DIV. 9

***HYDROGEN**
EXPLOSIONS

LIMITS OF EXPLOSION OF CL-H MIXTURES IN HCL; EFFECTS OF ADMIXTURES OF CO2, N2, O2 AND WATER VAPOR; EXPLOSIVE EXCITERS; SPARK DISCHARGE.
AD-292 616 DIV. 4

***HYDROGEN**
FUEL CELLS

GENERATION OF HYDROGEN FOR FUEL CELLS IN SUBMARINE PROPULSION.
AD-292 246 DIV. 4

***HYDROGEN**
GAS GENERATING SYSTEMS

A DESIGN STUDY OF AN OPERABLE H-GENERATING PLANT BASED ON STEAM REFORMING OF METHANOL; INTENDED AS H SOURCE FOR FUEL CELLS IN SUBMARINE PROPULSION.
AD-292 134 DIV. 7

***HYDROGEN**
SWITZERLAND

H GENERATION FROM METHANOL FOR GENERATING ELECTRICITY H2-O2 FUEL CELL SUBMARINES; CATALYSIS; THERMODYNAMICS; ENTHALPY; PHYSICAL PROPERTIES; CO AND CO2 REMOVAL.
AD-292 273 DIV. 7

***HYDROGEN**
SYNTHESIS

H GENERATION FROM LIGHT PETROLEUM DISTILLATE FOR GENERATING ELECTRICITY H2-O2 FUEL CELL SUBMARINE SERVICE; EQUIPMENT AND PROCESS DESIGN.
AD-292 252 DIV. 7

***HYDROGEN ELECTRODES**

FUEL CELL ELECTRODE MATERIALS. RAW MATERIAL SELECTION INFLUENCES POLARIZATION BUT IS NOT A SINGLE CONTROLLING FACTOR. AVAILABLE DATA INDICATES THAT AN INTERRELATIONSHIP OF PORUSITY, AVERAGE PORE VOLUME, AND PERMEABILITY CONTRIBUTES TO ELECTRODE FUEL CELL BEHAVIOR.
AD-293 490 DIV. 7

***HYDROGEN EMBRITTLEMENT**

HYDROGEN RELIEF OF NICKEL AND CHROMIUM ELECTROPLATED HOT-WORK DIE STEELS - VASCOJET 1000 (H-11).
AD-292 290 DIV. 17

***HYDROGRAPHIC SURVEYING**
ANTARCTIC REGIONS

OPERATION DEEP FREEZE; 62 MARINE GEOPHYSICAL OBSERVATIONS IN THE ANTARCTIC REGIONS.
AD-292 767 DIV. 2

***HYPERONS**

STRONG INTERACTION SYMMETRIES AND RELATIONS OF HYPERONS BETWEEN POLARIZATIONS ARE STUDIED.
AD-293 163 DIV. 9

***HYPERSONIC FLOW**

A NON-VISCOUS HYPERSONIC FLOW ABOUT A CIRCULAR CONE AT AN ANGLE OF ATTACK.
AD-292 958 DIV. 9

***HYPERSONIC NOZZLES**

INVISCID AND VISCOUS HYPERSONIC NOZZLE FLOW WITH FINITE RATE CHEMICAL REACTIONS.
AD-293 448 DIV. 9

***HYPERTENSION**
THERAPY

THE PHARMACOLOGICAL EFFECTS OF DIBAZOL, A RUSSIAN VASODILATOR, ARE REVIEWED; ITS VASODILATOR EFFECT ON KIDNEY VESSELS, ANTISPASMODIC EFFECT ON THE HORNS OF THE UTERUS AND PLACENTA, AND HYPOTENSIVE EFFECT WERE DEMONSTRATED IN RABBITS; ITS THERAPEUTIC EFFECT IN TOXEMIAS OF PREGNANCY WAS DOCUMENTED AND DISCUSSED.
AD-292 213 DIV. 16

***HYPERVELOCITY PROJECTILES**
SPALLATION

HYPERVELOCITY IMPACT PHENOMENA. SPALLATION OF THIN METAL PLATES.
AD-293 457 DIV. 22

***HYPOTHALAMUS**

CLARIFICATION OF THE HYPOTHALAMO-ANTERIOR HYPOPHYSICAL INTERRELATIONSHIP WITH EFFORTS CONCENTRATED ON REGULATION OF ACTH SECRETION AND REGULATION OF THE SECRETION OF GONADOTROPHINS.
AD-293 156 DIV. 16

***HYPOTHALAMUS**
STIMULATION

THE VASOMOTOR CENTERS IN THE HYPOTHALAMIC REGIONS WERE MAPPED BY HISTOLOGICAL EXAMINATION OF THE TISSUES FOLLOWING STIMULATION OF VARIOUS AREAS WITH A MONO-POLE ELECTRODE AND CAUTERIZING THE POINTS AT WHICH A PRESSOR OR DEPRESSOR RESPONSE OF MORE THAN 30 MM HG IS PRODUCED. EFFECT ON HEART RATE, RESPIRATION, AND STOMACH CONTRACTION WERE ALSO NOTED.
AD-292 262 DIV. 16

***ICE**

SOME PHYSICAL AND CHEMICAL MEASUREMENTS ON ICE WITH REFERENCE TO THE HARD HUNT CORES; OXYGEN ANALYSIS, GAS PRESSURE, STRENGTH, AND TRITIUM DIFFUSION.
AD-292 089 DIV. 2

***ICE**
ELECTRICAL PROPERTIES

ELECTRICAL D-C RESISTIVITY MEASUREMENTS ON GLACIER ICE NEAR THULE, GREENLAND.
AD-292 935 DIV. 2

***IDENTIFICATION SYSTEMS**

THE OPERATION AND DESIGN OF THE GPA-66 IS DESCRIBED.
AD-292 142 DIV. 6

***IDENTIFICATION SYSTEMS**
RADAR BEACONS

INTERFERENCE BLANKER AN/GPX-27 WHICH USES STORAGE TUBES TO ELIMINATE NONSYNCHRONOUS SIGNALS FROM RADAR BEACON VIDEO REPLIES.
AD-292 113 DIV. 6

***IMMUNOLOGY**
THEORY

PURIFICATION STUDIES WERE MADE OF LEUCOZYMES OF GUINEA PIG LEUCOCYTES AND THE STUDIES OF THEIR NATURE WERE CONTINUED. THE COMPLETE SEPARATION OF LEUCOZYME FROM LYSOZYME WAS ACHIEVED AND THIS PREPARATION HAD NO EFFECT ON THE MUCOPEPTIDE. LEUCOZYME A BETA STOPS OXYGEN UPTAKE AND CAUSES CYTOPLASMIC DESTRUCTION OF NONPATHOGENIC STAPHYLOCOCCI, AVIRULENT AND VIRULENT CHARACTERISTICS WERE OBSERVED IN OTHER TEST ANIMALS WHICH WERE SUBJECTED TO INFECTIONS OF PNEUMOCOCCI, ESCHERICHIA COLI, SHIGELLA, AND SALMONELLA STRAINS. THE ATTACK POINT OF PLAKIN ON THE CHAIN OF RESPIRATORY SYSTEM OF B. MEGATERIUM WAS CLARIFIED. PHOSPHOLIPIDS OF CYTOPLASMIC MEMBRANE WERE THE MAIN ATTACK POINT OF PLAKIN AND IT WAS THE CAUSE OF THE DAMAGE OF THE ELECTRON TRANSFERRING SYSTEM.
AD-292 263 DIV. 16

*IMPACT SHOCK

FEASIBILITY USING MORE ECONOMICAL TEST SPECIMENS THAN STANDARD CHARPY IMPACT SPECIMENS; TRANSITION TEMPERATURES; ENERGY-FRACTURE RELATIONSHIP; TEST METHODS.
AD-292 313 DIV. 17

*IMPACT SHOCK
PLASTICS

IMPACT SHOCK IN PLASTICS BY ULTRA-SHORT IMPULSE LOADING.
AD-292 122 DIV. 14

*INDICATOR LIGHTS

A LUMPED PARAMETER (TRANSISTORS, RESISTORS, DIODES AND LAMPS) MODEL OF A SOLID STATE SWITCHING CIRCUIT FOR ELECTRO-LUMINESCENT DISPLAYS.
AD-292 097 DIV. 5

*INDIUM COMPOUNDS

HALL EFFECT INVESTIGATIONS; GALVANOMAGNETIC MEASUREMENTS ON EVAPORATED THIN FILMS OF INSB ON GLASS SUBSTRATES; MAGNETORESTRICTIVE CONTRIBUTION OF INSB FILMS.
AD-293 433 DIV. 27

*INERTIAL GUIDANCE
DIGITAL COMPUSERS

ANALYSIS OF NONCATASTROPHIC FAILURES IN DIGITAL GUIDANCE SYSTEMS.
AD-292 676 DIV. 12

*INERTIAL GUIDANCE
RELIABILITY

PROPOSED TESTS TO DETERMINE THE POSSIBILITY OF REMOVING OR REDUCING THE AIR CONDITIONING NOW REQUIRED BY THE PERSHING MISSILE GUIDANCE AND CONTROL COMPARTMENT.
AD-292 948 DIV. 12

*INFECTIONS

SEROLOGICAL STUDY ON THE SERUM AND RECTAL MUCUS ASPIRATED ALMOST PURELY FROM THE RECTAL CAVITY OF PATIENTS WITH SHIGELLOSIS AND WITH SALMONELLOSIS USING A ROMANOSCOPE. COMPARATIVE STUDIES OF AN AGGLUTINATION, A HEM-AGGLUTINATION AND A LATEX AGGLUTINATION TEST SHOWED THAT THE HEM-AGGLUTININ TITER AND THE LATEX AGGLUTININ TITER WERE HIGHER THAN THE AGGLUTININ TITER. THE LATEX AGGLUTINATION TEST OFFERS THE ADVANTAGE OF YIELDING EXACT, READABLE RESULTS WITHIN TWO HOURS OVER BOTH THE AGGLUTINATION TEST AND THE HEM-AGGLUTINATION TEST IN WHICH READING CAN BE MADE ONLY AFTER TWENTY-FOUR HOURS.
AD-292 261 DIV. 16

*INFECTIONS
PURIFICATION

PURIFICATION STUDIES WERE MADE OF LEUCOZYMES OF GUINEA PIG LEUCOCYTES AND THE STUDIES OF THEIR NATURE WERE CONTINUED. THE COMPLETE SEPARATION OF LEUCOZYME FROM LYSOZYME WAS ACHIEVED AND THIS PREPARATION HAD NO EFFECT ON THE MUCOPEPTIDE. LEUCOZYME A BETA STOPS OXYGEN UPTAKE AND CAUSES CYTOPLASMIC DESTRUCTION OF NONPATHOGENIC STAPHYLOCOCCI. AVIRULENT AND VIRULENT CHARACTERISTICS WERE OBSERVED IN OTHER TEST ANIMALS WHICH WERE SUBJECTED TO INFECTIONS OF PNEUMOCOCCI, ESCHERICHIA COLI, SHIGELLA, AND SALMONELLA STRAINS. THE ATTACK POINT OF PLAKIN ON THE CHAIN OF RESPIRATORY SYSTEM OF B. MEGATERIUM WAS CLARIFIED. PHOSPHOLIPIDS OF CYTOPLASMIC MEMBRANE WERE THE MAIN ATTACK POINT OF PLAKIN AND IT WAS THE CAUSE OF THE DAMAGE OF THE ELECTRON TRANSFERRING SYSTEM.
AD-292 363 DIV. 16

*INFORMATION RETRIEVAL

SOME PROBLEMS OF BASIC ORGANIZATION IN PROBLEM-SOLVING PROGRAMS.
AD-292 109 DIV. 30

THE 650 EXECUTIVE ROUTINE PILOT MODEL FOR INFORMATION STORAGE AND RETRIEVAL SYSTEMS.
AD-293 106 DIV. 30

*INFRARED EQUIPMENT
CONTAMINATION

INVESTIGATION OF THE CONTAMINATION OF REFLECTOR SURFACES OF INFRARED RADIATORS TO BE USED IN SPACE SIMULATORS.
AD-292 086 DIV. 30

*INFRARED SPECTROSCOPY

IR SPECTRAL DATA FOR 41 ALDEHYDES; SPECTRA-STRUCTURE CORRELATION; ALIPHATIC; AROMATIC; ALPHA-OLEFINIC; BENZALDEHYDES.
AD-292 248 DIV. 4

INVESTIGAIONS IN THE FIELD OF SURFACE FORCES; COLLECTION OF 8 TECHNICAL REPORTS TRANSLATED FROM RUSSIAN.
AD-292 623 DIV. 25

FREQUENCY ASSIGNMENTS 1/650 TO 1/250 CM SPECTRAL REGION FOR 279 BENZENE DERIVATIVES; RAMAN SPECTRA; IR SPECTRA; RING DEFORMATION.
AD-292 627 DIV. 4

*INORGANIC SUBSTANCES

DEVELOPMENT OF COMPOSITE MATERIALS FOR USE AS STATIC AND DYNAMIC SEALS, CRYOGENIC TO 2000 F UP TO 500 PSI, RECIPROCATING SHAFTS; SEALING CABINS OF SPACESHIPS.
AD-291 986 DIV. 14

*INSECTS
ALASKA

THE INCIDENCE AND DISTRIBUTION OF VARIOUS ACTUAL AND POTENTIAL INVERTEBRATE DISEASE VECTORS IN ALASKA.
AD-293 190 DIV. 16

*INSTALLATION

PRINTED CABLES AND CONNECTORS.
AD-293 629 DIV. 8

*INSTRUCTION MANUALS

A COMPILATION OF HANDBOOKS CATALOGED BY ASTIA FROM 1952 THROUGH 1962.
AD-292 750 DIV. 32

*INSTRUMENTATION
SOLDERING

A COMPUTER PROGRAM FOR DETERMINING RADAR TRACKING INFORMATION FROM MISSILE POSITION, VELOCITY AND ATTITUDE DATA.
AD-293 489 DIV. 30

*INSULATING MATERIALS

FIRE RESISTANCE TESTS ON NEOPRENE COATED FIBERGLASS CLOTH USED FOR CARGO COMPARTMENT LINERS.
AD-292 297 DIV. 14

A MAGNETOGASDYNAMIC ASYNCHRONOUS GENERATOR.
AD-292 654 DIV. 9

*INTEGRAL EQUATIONS

A DISCUSSION OF THE DUFFING PROBLEM.
AD-292 638 DIV. 15

INTERVAL ARITHMETIC AND AUTOMATIC ERROR ANALYSIS IN DIGITAL COMPUTING.
AD-293 442 DIV. 30

*INTEGRAL TRANSFORMS

DERIVATION OF AN INTEGRAL INVERSION FORMULA FOR AN INTEGRAL TRANSFORMATION WHICH CONTAINS THE GEGENBAUER POLYNOMIAL IN THE KERNEL.
AD-293 456 DIV. 15

*INTEGRALS

ASYMPTOTIC POWER SERIES EXPANSION OF INTEGRALS INVOLVING LARGE PARAMETERS AND SEPARATION OF ALL SINGULARITIES FROM THE SADDLE POINT.
AD-292 997 DIV. 15

DERIVATION OF AN INTEGRAL INVERSION FORMULA FOR AN INTEGRAL TRANSFORMATION WHICH CONTAINS THE GEGENBAUER POLYNOMIAL IN THE KERNEL.
AD-293 456 DIV. 15

*INTEGRALS
TAYLOR'S SERIES

ASYMPTOTIC POWER SERIES EXPANSIONS OF INTEGRALS INVOLVING A LARGE PARAMETER; ONE SINGULARITY CLOSE TO THE SADDLE POINT.
AD-292 916 DIV. 15

*INTEGRATION

EFFECT OF DEGRADED OPERATIONAL MODES ON THE ACCUMULATION OF ERRORS IN NUMERICAL INTEGRATION; TRAPEZOIDAL RULE.
AD-292 678 DIV. 30

EXTENSION OF THEOREM THAT THE MEASURE ON THE COUNTABLE DIRECT PRODUCT OF REAL LINES WITH IDENTICAL GAUSSIAN MEASURES TRANSFORMS TO AN EQUIVALENT MEASURE UNDER A LINEAR TRANSFORMATION WITH A HILBERT-SCHMIDT OPERATOR.
AD-292 915 DIV. 15

*INTEGRATION
FUNCTIONAL ANALYSIS

SOME ASPECTS OF FUNCTIONAL INTEGRATION.
AD-292 917 DIV. 15

*INTELLIGIBILITY

AN INTERFEROMETER STUDY OF THE EFFECT OF REDUCED PRESSURE ON FREE CONVECTION FROM A VERTICAL PLATE.
AD-293 178 DIV. 25

*INTENSITY

COMPARISON OF MEASURED AND THEORETICAL VALUES OF THE SPECTRAL INTENSITY OF ULTRAVIOLET SKY RADIATION.
AD-292 911 DIV. 25

*INTERCOMMUNICATION SYSTEMS

COMPATIBILITY EVALUATION FOR PRINTED TAPE BUFFER EQUIPMENT; TAPE HEADER AND TAPE RECORDER.
AD-291 930 DIV. 8

*INTERFEROMETERS

THE INTERACTION OF LAMINAR BOUNDARY LAYERS SURROUNDING HORIZONTAL CYLINDERS IN FREE CONVECTION.
AD-292 333 DIV. 9

RESONANCES OF THE FABRY-PEROT LASER.
AD-293 401 DIV. 25

*INTERFEROMETERS
OPTICAL EQUIPMENT

OPTICAL INTERFEROMETRY FOR PLASMA DIAGNOSTICS.
AD-292 626 DIV. 20

*INTERSTELLAR MATTER

STELLAR SIMULATOR FEASIBILITY STUDY.
AD-292 649 DIV. 2

*INTRAVENOUS FEEDING
FATS

THE EFFECT OF INTRAVENOUS ADMINISTRATION OF VARIOUS FAT EMULSIONS ON THE ULTRASTRUCTURE OF THE LIVER AND THE FORMULATION OF HEPATIC PIGMENTS.
AD-293 128 DIV. 16

*IONIZATION

CONTINUING RESEARCH ON NONTHERMAL IONIZATION IN CESIUM AND CESIUM-HELIUM GAS DISCHARGE TUBES.
AD-293 420 DIV. 25

*IONOSPHERE

A SOLUTION FOR ELF PROPAGATION IN THE EARTH-IONOSPHERE CAVITY BOUNDED BY AN INHOMOGENEOUS ANISOTROPIC IONOSPHERIC MEDIUM.
AD-292 166 DIV. 25

THE DIFFUSION OPERATOR IS DERIVED FOR MOTION OF ELECTRONS ALONG THE LINES OF FORCE OF A DIPOLE APPROXIMATION TO THE GEOMAGNETIC FIELD.
AD-292 738 DIV. 25

INVESTIGATION OF HIGH FREQUENCY PROPAGATION IN THE IONOSPHERE USING SATELLITE TRANSMISSIONS.
AD-293 430 DIV. 8

*IONOSPHERE
ROCKET RESEARCH

INVESTIGATION OF THE LOWER IONOSPHERE BY MEANS OF LONG RADIO WAVES AND LOW-FREQUENCY PROBES INSTALLED ON A ROCKET.
AD-292 950 DIV. 2

*IONOSPHERIC PROPAGATION

THE TRANSMISSION OF AUDIO-FREQUENCY ELECTROMAGNETIC WAVES THROUGH THE TERRESTRIAL IONOSPHERE IN THE MAGNETO-IONIC MODE.
AD-292 718 DIV. 25

MEASUREMENTS OF THE DISTRIBUTION OF ELECTRONS IN THE F-REGION OF THE IONOSPHERE BY OBSERVING THE WEAK INCOHERENT BACKSCATTER SIGNAL.
AD-292 730 DIV. 8

EFFORTS TO DETECT THE LONG-DELAYED ECHOES WHICH SHOULD RESULT FROM THE MAGNETIC DUCT THEORY OF PROPAGATION.
AD-293 223 DIV. 8

*IONS
PSYCHOMOTOR TESTS

THE EFFECTS OF AIR IONS ON HUMAN PERFORMANCE DURING PSYCHOMOTOR TASKS.
AD-293 170 DIV. 28

*ISRAEL

THE POTENTIAL INFLUENCE OF CERTAIN PRE-SITUATIONAL FACTORS IN ROLE FUNCTIONING.
AD-292 251 DIV. 32

*JET ENGINES

EFFECT OF CHEMICAL COMBUSTION AND ADMIXTURES ON COMBUSTION OF JET ENGINE FUELS; AIR-COOLED ENGINES; HYDROCARBONS.
AD-292 214 DIV. 10

*JET FIGHTERS
REFUELING IN FLIGHT

PROTOTYPE DEVELOPMENT OF MODEL 385 AIR REFUELING STORE.
AD-293 628 DIV. 1

*JET STREAMS (METEOROLOGY)

A DIGITAL METEOROLOGICAL DATA-ACQUISITION SYSTEM NOCTURNAL LOW LEVEL JET.
AD-292 187 DIV. 2

*JETS
TURBULENT FLOW

GENERATION OF A STRONGLY SWIRLING JET AND PRELIMINARY EXPERIMENTS ON THE EFFECT ON ITS DEVELOPMENT OF INITIAL SWIRL DISTRIBUTION.
AD-292 300 DIV. 9

*KINETIC THEORY

SQUID PROJECT REPORT.
AD-293 674 DIV. 9

*LAMINAR BOUNDARY LAYER
MIXTURES

LAMINAR MIXING OF TWO PARALLEL STREAMS IN THE PROXIMITY OF A SEMI-INFINITE PLATE.
AD-292 047 DIV. 9

*LAMINAR BOUNDARY LAYER
SEPARATION

LAMINAR SEPARATION IN SUPERSONIC FLOW.
AD-292 901 DIV. 9

*LAMINATED GLASS

GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS. WETTING OF RESIN ON GLASS WAS GREATER THAN WATER ON GLASS, AS INDICATED BY THE CAPTIVE BUBBLE TECHNIQUE. DETAILED INFORMATION ON SIZE AND SHAPE OF AN AIR VOID NEAR THE GLASS SURFACE IS PRESENTED.
AD-292 256 DIV. 14

*LAMINATES

CALCULATION OF THE IONIZING INTENSITY OF THE ELECTRICAL FIELD OF A LAMINATED DIELECTRIC MADE OF CAPACITOR PAPER.
AD-292 199 DIV. 7

QUALIFICATION TESTS FOR LAMINATES OF 181 OLAN A WITH TREVARNO F-140-11 RESIN-MECHANICAL PROPERTIES.
AD-292 286 DIV. 14

*LAMINATES
BONDING

GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS. WETTING OF RESIN ON GLASS WAS GREATER THAN WATER ON GLASS, AS INDICATED BY THE CAPTIVE BUBBLE TECHNIQUE. DETAILED INFORMATION ON SIZE AND SHAPE OF AN AIR VOID NEAR THE GLASS SURFACE IS PRESENTED.
AD-292 256 DIV. 14

*LAMINATES
ELECTRICAL PROPERTIES

CONFORMAL COATINGS FOR PRINTED CIRCUIT ASSEMBLIES: EPOXY-, ACRYLIC-, AND POLYSTYRENE COATING SYSTEMS; PHYSICAL AND ELECTRICAL PROPERTIES; ADHESION AND HUMIDITY EFFECTS.
AD-293 236 DIV. 14

*LAMINATES
MECHANICAL PROPERTIES

QUALIFICATION TESTS OF GLASS TEXTILE LAMINATES FIBERGLAS CLOTH NO. 181 VOLAN A, EPON 828 EPOXY RESIN, APCO 320 CATALYST; TENSILE, COMPRESSION, FLEXURAL TESTS.
AD-292 282 DIV. 14

*LAMINATES
TESTS

FIBERGLASS LAMINATES - FIBERGLASS CLOTH NO. 181 VOLAN A - POLYLITE 8000 POLYESTER RESIN.
AD-292 288 DIV. 14

FIBERGLASS LAMINATES - FIBERGLASS CLOTH NO. 181 VOLAN A - POLYLITE 8000 POLYESTER RESIN.
AD-292 291 DIV. 14

*LANGUAGE

A LEFT-TO-RIGHT GENERATIVE GRAMMAR OF FRENCH.
AD-293 252 DIV. 12

*LANGUAGE
USSR

FOURTH ANNUAL REPORT ON MACHINE-AIDED TRANSLATION RESEARCH FROM RUSSIAN INTO ENGLISH.
AD-292 711 DIV. 12

*LASERS

EXPERIMENTS WITH ALPHA AND BETA GA(210)(3) AND WITH NEODYMIUM GLASS LASERS.
AD-293 199 DIV. 8

A LASER AS A LIGHT SOURCE FOR PHOTOGRAPHIC LIGHT SCATTERING FROM POLYMER FILMS. A POLARIZED SCATTERING PATTERN FROM A MIL THICK MEDIUM DENSITY POLYETHYLENE FILM OBTAINED WITH A SINGLE FLASH OF A LASER OF ABOUT 500 MICRON SEC DURATION IS COMPARED WITH A SIMILAR PICTURE REQUIRING A 4.5 HR EXPOSURE WITH CONVENTIONAL APPARATUS.
AD-293 290 DIV. 8

RESONANCES OF THE FABRY-PEROT LASER.
AD-293 401 DIV. 25

*LAUNCHING
PREPARATION

CONTROL AND INSTRUMENTATION DATA FOR THE TITAN I PROPELLANT LOADING SYSTEM.
AD-293 627 DIV. 12

*LEADERSHIP

SOCIAL INFLUENCES ON SMALL GROUP BEHAVIOR. LEADERSHIP, JUDGMENT, AND PROPAGANDA.
AD-293 247 DIV. 12

*LEARNING

PAIRED-ASSOCIATES LEARNING UNDER VARIATIONS IN OCCURRENCES OF RESPONSE MEMBERS FROM AN EXPERIMENTAL AND FROM AN ORIENTATIVE-THEORETICAL POINT OF VIEW.
AD-292 153 DIV. 28

*LEUKOCYTES

PURIFICATION STUDIES WERE MADE OF LEUCOZYMES OF GUINEA PIG LEUCOCYTES AND THE STUDIES OF THEIR NATURE WERE CONTINUED. THE COMPLETE SEPARATION OF LEUCOZYME FROM LYSOZYME WAS ACHIEVED AND THIS PREPARATION HAD NO EFFECT ON THE MUCOPEPTIDE. LEUCOZYME A BETA STOPS OXYGEN UPTAKE AND CAUSES CYTOPLASMIC DESTRUCTION OF NONPATHOGENIC STAPHYLOCOCCI. AVIRULENT AND VIRULENT CHARACTERISTICS WERE OBSERVED IN OTHER TEST ANIMALS WHICH WERE SUBJECTED TO INFECTIONS OF PNEUMOCOCCI, ESCHERICHIA COLI, SHIGELLA, AND SALMONELLA STRAINS. THE ATTACK POINT OF PLAKIN ON THE CHAIN OF RESPIRATORY SYSTEM OF B. MEGATERIUM WAS CLARIFIED. PHOSPHOLIPIDS OF CYTOPLASMIC MEMBRANE WERE THE MAIN ATTACK POINT OF PLAKIN AND IT WAS THE CAUSE OF THE DAMAGE OF THE ELECTRON TRANSFERRING SYSTEM.
AD-292 263 DIV. 16

*LIGHT
SOURCES

TWINKLING OF LIGHT SOURCES ON THE EARTH AND OTHER NOTES.
AD-292 230 DIV. 2

*LIGHT COMMUNICATION SYSTEMS

ACQUISITION AND TRACKING LIMITATIONS FOR TWO HYPOTHETICAL OPTICAL SPACE COMMUNICATION LINKS: ONE BETWEEN AN EARTH SATELLITE AND A MOON SATELLITE AND ANOTHER BETWEEN AN EARTH SATELLITE AND A SPACE VEHICLE. TYPICAL ACQUISITION AND TRACKING SUBSYSTEMS.
AD-293 452 DIV. 5

*LIGHTING SYSTEMS
AIRPORTS

ACTIVITY REPORT ON AIRPORT FACILITY INCLUDING TRAFFIC CONTROL, DISPLAY SYSTEMS, LIGHTING, COMMUNICATIONS, AND LANDING SYSTEMS.
AD-292 072 DIV. 1

*LIGHTNING

RADIOGONIOMETRIC INVESTIGATIONS OF THUNDERSTORMS AND CLOUDS OF GREAT ELECTRICAL ACTIVITY.
AD-292 643 DIV. 2

*LINEAR PROGRAMMING

VON NEUMANN'S ALGORITHM FOR SOLVING A MATRIX GAME INPUT ON AN IBM 7090 AND COMPARED WITH THE SIMPLEX METHOD AND "FICTITIOUS PLAY". THE ALGORITHM IS SHOWN TO BE SENSITIVE TO DOMINANCE IN THE PAYOFF MATRIX.
AD-292 691 DIV. 15

SHORT CUT COMPUTATIONAL METHODS ARE DEVELOPED FOR SOLVING SYSTEMS WHOSE MATRICES MAY BE GENERALLY DESCRIBED AS BLOCK TRIANGULAR.
AD-293 674 DIV. 15

*LINEAR SYSTEMS

CERTAIN PROBLEMS IN THE THEORY OF MULTIVARIABLE LINEAR AUTOMATIC CONTROL SYSTEMS ARE DETERMINED AND SOLVED.
AD-292 602 DIV. 8

CALCULATION AND CONSTRUCTION OF AN ACCELERATING SYSTEM FOR A LINEAR ACCELERATOR WITH INTENSIVE FOCUSING.
AD-292 661 DIV. 25

*LIPIDS

FEEDING LOW PROTEIN DIETS TO GROWING CHICKS RESULTS IN ELEVATED PLASMA CHOLESTEROL AND GLYCERIDE LEVELS, BUT DOES NOT ALTER THE PLASMA LIPID PHOSPHORUS LEVELS IN THE ABSENCE OF DIETARY CHOLESTEROL. DIETARY CHOLESTEROL ELEVATED ALL PLASMA LIPID COMPONENTS REGARDLESS OF DIETARY PROTEIN LEVEL; THE INCREASES WERE GREATER IN THE LOW PROTEIN FED GROUPS. THE FATTY ACID COMPOSITION OF PLASMA AND LIVER CHOLESTEROL ESTERS WAS ALTERED BY THE DIETARY TREATMENTS EMPLOYED.
AD-292 642 DIV. 16

*LIQUID METALS

HEAT TRANSFER ON THE SURFACE OF A BODY BEING MELTED IN A SUPERSONIC STREAM WITH MOLTEN METAL FED THROUGH POROUS WALL SURFACE: EFFECT OF LIQUID FILM.
AD-292 236 DIV. 25

*LIQUID ROCKET PROPELLANTS
LOADING

CONTROL AND INSTRUMENTATION DATA FOR THE TITAN I PROPELLANT LOADING SYSTEM.
AD-293 627 DIV. 12

*LIQUID ROCKET PROPELLANTS
SPECIFIC IMPULSE

PROPELLANT PERFORMANCE AND GAS COMPOSITION HANDBOOK. PERFORMANCE TABLES OBTAINED BY PLOTTING DATA FROM MACHINE CALCULATIONS AND INTERPOLATING TO OBTAIN VACUUM SPECIFIC IMPULSES FOR INTEGRAL VALUES OF THE AREA RATIO. TABLES OF GAS COMPOSITIONS AND PERFORMANCES.
AD-293 403 DIV. 10

*LIQUIDS

USE OF VARIATIONAL METHODS IN PROBLEMS OF VIBRATION OF LIQUID AND LIQUID-FILLED BODIES. UNIVERSALITY AND STANDARDIZATION OF COMPUTER PROGRAMMING ARE SEEN AS POTENTIAL ADVANTAGES.
AD-292 340 DIV. 9

NUCLEAR RELAXATION OF N-14 BY QUADRUPOLE INTERACTION IN MOLECULAR LIQUIDS.
AD-293 441 DIV. 20

*LIQUIDS
TRANSPORTATION

SUITABILITY OF THE 1000-GAL ROLLING LIQUID TRANSPORTER FOR ARMY USE UNDER ARCTIC CONDITIONS.
AD-292 320 DIV. 11

*LITERATURE

REVIEW OF BOOK 'PLANETS AND SATELLITES'.
AD-292 168 DIV. 32

*LITERATURE
INDEXES

CONCERNING THE PROBABILITY THAT A GIVEN PAPER WILL BE CITED.
AD-293 251 DIV. 32

*LITHIUM

INSTRUMENTATION FOR MEASUREMENT OF VAPOR PRESSURE OF ALKALI METALS (CS, K, NA, LI) FROM 10 TO THE -5TH POWER TO 10 TO THE -2ND POWER MM HG.
AD-292 216 DIV. 4

*LIVER

STUDIES OF HEPATIC LIPOGENESIS TO RATS THAT HAVE LIVED IN THE COLD SEVERAL MONTHS. DEPRESSED LIPOGENESIS AND REDUCTION IN FATTY ACID SYNTHESIS WERE NOT THE RESULT OF A CURTAILED HEPATIC CARBOHYDRATE METABOLISM. OXIDATION OF ACETATE-1-C14 TO C140(2) AND INCORPORATION OF ACETATE-1-C(14) INTO LONG CHAIN FATTY ACIDS WERE STUDIED.
AD-293 185 DIV. 16

*LIVER
FATTY ACIDS

THE ABILITY OF LIVER TO SYNTHESIZE FATTY ACIDS FROM ACETATES WAS MARKEDLY DEPRESSED. A CAUSAL RELATIONSHIP BETWEEN THE DEPRESSED LIPOGENESIS AND LOW LIVER CARBOHYDRATE WAS APPARENT. THE OXIDATION OF ACETATE SHOWN BY C(14)O(2) PRODUCTION WAS NOT AFFECTED BY EXPOSURE FOR 1 TO 2 DAYS. THE EFFECT OF LOW ENVIRONMENTAL TEMPERATURES ON HEPATIC CHOLESTEROL SYNTHESIS IS COMPLEX.
AD-293 184 DIV. 16

*LIVER
HISTOLOGY

THE EFFECT OF INTRAVENOUS ADMINISTRATION OF

VARIOUS FAT EMULSIONS ON THE ULTRASTRUCTURE OF THE LIVER AND THE FORMULATION OF HEPATIC PIGMENTS.
AD-293 125 DIV. 16

*LIVER
METABOLISM

THE EFFECT OF COLD ACCLIMATION AND FASTING ON FATTY ACID ANABOLISM AND CATABOLISM AND ON THE VITAMIN A CONTENT OF LIVER IS REPORTED.
AD-293 133 DIV. 16

*LOADING

ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
AD-292 118 DIV. 25

*LOW PASS FILTERS

PROPERTIES OF SOME ALL-POLE TRANSFER FUNCTION OF FILTERS.
AD-293 153 DIV. 8

*LOW TEMPERATURE BATTERIES

LOW TEMPERATURE RA-2270/U-ALT-1 BATTERIES: IN-PLANT AND SIGNAL CORPS TESTING OF 500 BATTERIES: DISCHARGE AND ELECTROLYTE LEAKAGE TESTS: PERFORMANCE UP TO AND INCLUDING 24 MONTHS DELAY.
AD-293 425 DIV. 7

*LOW TEMPERATURE LUBRICANTS

SELECTION OF CANOPY SEAL ANTI-FREEZE LUBRICANT
AD-292 292 DIV. 14

*LUBRICANTS

SELECTION OF CANOPY SEAL ANTI-FREEZE LUBRICANT
AD-292 292 DIV. 14

*LUBRICANTS
PHYSICAL PROPERTIES

VISCOSITY OF MIXTURES OF OILS (SILICONE AND PETROLEUM): CONSISTENT LUBRICANTS BY THICKENING WITH LI STEARATE AND CERESIN.
AD-292 202 DIV. 14

EFFECT OF COMPOSITION AND GASEOUS MEDIA ON ANTIWEAR PROPERTIES OF PETROLEUM LUBRICATING OILS: FRICTION: OXIDATION INHIBITORS: HIGH TEMPERATURE AND PRESSURE.
AD-292 234 DIV. 14

*LUBRICANTS
SPACE ENVIRONMENTAL CONDITIONS

EFFECTS OF VACUUM AS FOUND IN SPACE, ON PLASTICS, METALS, ELASTOMERS, OXIDES, AND LUBRICANTS. VACUUM TERMINOLOGY, PHYSICAL CONSTANTS AND CONCEPTS OF SPACE VACUUM.
AD-292 920 DIV. 14

*LUMINESCENCE

EFFECT IR RADIATION ON LUMINESCENCE PURE AND MIXED ASCL OR AGBR PHOSPHORS.
AD-292 665 DIV. 25

SPECTROPHOTOMETRIC STUDY OF THE LUNAR SURFACE.
AD-292 765 DIV. 2

*LUMINESCENCE
MOON

ANNUAL SUMMARY OF WORK ON LABORATORY SIMULATION OF LUNAR LUMINESCENCE.
AD-292 725 DIV. 2

*LUMINOUS PIGMENTS

FLUORESCENT COATINGS ON COARSE SEDIMENTS. MANY ASPECTS OF BEACH MORPHOLOGY PROVED AMENABLE TO STUDY USING COATED PARTICLES.
AD-292 195 DIV. 30

*LUNAR PROBES

ACQUISITION AND TRACKING LIMITATIONS FOR TWO HYPOTHETICAL OPTICAL SPACE COMMUNICATION LINKS: ONE BETWEEN AN EARTH SATELLITE AND A MOON SATELLITE AND ANOTHER BETWEEN AN EARTH SATELLITE AND A SPACE VEHICLE. TYPICAL ACQUISITION AND TRACKING SUBSYSTEMS.
AD-293 452 DIV. 5

*LUNAR PROBES
GUIDED MISSILE TRAJECTORIES

CONSIDERATION OF LUNAR OBLATENESS ON NUMERICAL INTEGRATION OF CIRCUMLUNAR TRAJECTORIES.
AD-292 428 DIV. 12

*MACH NUMBER

DESIGN AND PERFORMANCE OF A TWO-DIMENSIONAL, SHARP-EDGE-THROAT, MACH 3 NOZZLE IN A LABORATORY SHOCK TUBE.
AD-292 180 DIV. 25

*MACHINE TRANSLATION

INSTRUCTIONS FOR CODING RUSSIAN WORDS AND IDIOMS, AND A RUSSIAN-ENGLISH DICTIONARY FOR MACHINE TRANSLATION.
AD-292 706 DIV. 30

FOURTH ANNUAL REPORT ON MACHINE-AIDED TRANSLATION RESEARCH FROM RUSSIAN INTO ENGLISH.
AD-292 711 DIV. 32

*MACHINE TRANSLATION
COMPUTERS

IMPLEMENTATION OF A COMPUTER SYSTEM TO SUPPORT MECHANICAL TRANSLATION: AND OTHER LINGUISTIC PROCESSES WHICH ARE POTENTIALLY APPLICABLE TO SCIENTIFIC DOCUMENTATION.
AD-292 136 DIV. 30

*MACHINING

EFFECT OF THERMAL DEFORMATIONS OF MACHINE UNITS OF PRECISION GRINDING ON MACHINING ACCURACY: DEFORMATION: FRICTION: LATHE MACHINES.
AD-292 215 DIV. 24

*MAGNETIC FIELDS

A MAGNETOGASDYNAMIC ASYNCHRONOUS GENERATOR.
AD-292 654 DIV. 9

LONG LIFE CLOSED-LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
AD-293 438 DIV. 25

*MAGNETIC RECORDING SYSTEMS

RESTORATION OF QUENCHING AND SYNCHRONIZING PULSES IN THE VIDEO SIGNAL AFTER MAGNETIC RECORDING.
AD-292 231 DIV. 8

TAPE ADAPTATION AND CONTROL UNIT.
AD-292 341 DIV. 30

*MAGNETIC RECORDING SYSTEMS
MEMORY

A MAGNETIC FILM MEMORY OPERATING ON AN EXPERIMENTAL BASIS IN THE FX-1 COMPUTER.
AD-292 172 DIV. 30

*MAGNETIC SUSCEPTIBILITY

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS. MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES. DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE PARAMAGNETIC SALTS, POSSIBILITY OF OBSERVING THE MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON COMPLEXES IN CDS AND COSF.
AD-292 324 DIV. 25

*MAGNETOHYDRODYNAMICS

DEVELOPMENT OF A SYNCHRONOUS MAGNETOGASDYNAMIC A-C GENERATOR.
AD-292 220 DIV. 7

THEORY OF A MAGNETOGASDYNAMIC GENERATOR.
AD-292 226 DIV. 7

A MAGNETOGASDYNAMIC ASYNCHRONOUS GENERATOR.
AD-292 654 DIV. 9

BIBLIOGRAPHY OF RUSSIAN LITERATURE IN THE FIELD OF MAGNETOHYDRODYNAMICS, 1958 TO 1962. MAIN SOURCES INCLUDED INTERNATIONAL AEROSPACE ABSTRACTS, MONTHLY INDEX TO RUSSIAN ACCESSIONS, ENGINEERING INDEX, TECHNICAL TRANSLATIONS, NASA ANNOUNCEMENTS, AND MONTHLY CATALOGUE OF U.S. GOVERNMENT PUBLICATIONS.
AD-293 273 DIV. 9

LONG LIFE CLOSED-LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
AD-293 438 DIV. 25

*MAGNETS

THE PERT SYSTEM AND ITS CHIEF MATHEMATICAL ASSUMPTIONS ARE ANALYZED.
AD-293 423 DIV. 33

*MAINTENANCE
MANAGEMENT ENGINEERING

THE ONNARD AIR FORCE BASE MAINTENANCE MANAGEMENT PROGRAM, I.E., EVALUATION, UTILIZATION, SCHEDULING.
AD-292 900 DIV. 23

*MANAGEMENT ENGINEERING

HOW RESPONSIVE THE AIR FORCE SYSTEM SHOULD BE IN TRANSLATING CHANGING SUPPORT NEEDS INTO WORKLOADS IN BACK UP AREAS OF SUPPORT.
AD-293 431 DIV. 18

*MANAGEMENT ENGINEERING
PROGRAMMING

A WELL-FORMULATED MODEL OF THE ELEMENTS, CHARACTERISTICS AND STRUCTURE OF MANAGEMENT CONTROL SYSTEMS. DESCRIPTION OF COMPUTER PROGRAM "SIMPAC" AND THE "MARK I" SIMULATED MODEL.
AD-292 697 DIV. 30

*MANUFACTURING METHODS

PRODUCTION FACILITIES FOR MULTI-TURN METAL FILM TRIMMER RESISTORS. EQUIPMENT AND TOOLS FOR PRODUCING 350 UNITS FOR 8 HOUR SHIFT.
AD-291 972 DIV. 8

PRODUCTION ENGINEERING MEASURE TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL TRANSISTOR WITH A MAXIMUM OPERATING FAILURE RATE OF 0.001% PER 1000 HOURS AT A 90% CONFIDENCE LEVEL AT 25 C.
AD-292 071 DIV. 8

DESIGN OF 9TH OVERTONE QUARTZ CRYSTAL UNITS FROM 150 TO 200 MC.
AD-293 261 DIV. 8

ENGINEERING PRODUCTION MEASURE TO INCREASE TRANSISTOR RELIABILITY TO A MAXIMUM OPERATING FAILURE RATE OF 0.01% AND 0.001% PER 1000 HOURS AT 90% CONFIDENCE LEVEL.
AD-293 271 DIV. 8

FABRICATION AND TESTING OF SEVEN CONVOLUTION ELECTRON BEAM WELDED SERPENTINE LIGHTWEIGHT WAVEGUIDES.
AD-293 612 DIV. 8

*MANUFACTURING METHODS
METALLURGY

MANUFACTURING PROCESSES INVOLVED IN PRODUCTION OF POROUS TUNGSTEN EMITTERS FOR USE IN AN ATMOSPHERE OF CESIUM IN DEVELOPMENT OF ELECTRIC POPULSION SYSTEM.
AD-292 257 DIV. 27

INHIBITION OF BETA GRAIN GROWTH IN TITANIUM ALLOYS BY ADDITION OF VARIOUS ELEMENTS: BORON, SULFUR, SILVER, HAFNIUM, BARIUM, OR STRONTIUM.
AD-292 703 DIV. 17

*MANUFACTURING METHODS
QUARTZ CRYSTALS

EFFORTS TO PRODUCE FILTER TYPE CRYSTALS FOR USE IN THE HIGH FREQUENCY BAND.
AD-292 910 DIV. 8

*MAPPING

MAPPING OF THE HORSESHOE COVE SHORELINE, SANDY HOOK, NEW JERSEY.
AD-292 156 DIV. 2

*MAPPING
INSTRUMENTATION

TESTS OF BASIC GEOMETRICAL QUALITIES OF PHOTOGRAMMETRIC PLOTTING INSTRUMENT.
AD-292 971 DIV. 2

*MARINE BIOLOGY

ANALYSIS OF LIPID METABOLITES OF PLANKTON ORGANISMS (SARGASSUM AND CTENOPHORE) AND ASSOCIATED WATER SURFACE FILMS.
AD-293 238 DIV. 16

*MATERIALS
AIR FORCE RESEARCH

REVIEW OF AIR FORCE MATERIALS RESEARCH AND DEVELOPMENT PROGRAM. ABSTRACTS OF REPORTS CONCERNED WITH THE FOLLOWING: METALS AND CERAMICS, NON-METALLIC MATERIALS, PHYSICS, MANUFACTURING TECHNOLOGY, APPLICATION STUDIES.
AD-292 152 DIV. 14

*MATERIALS
EQUATIONS OF STATE

SYMPOSIUM ON EQUATION OF STATE FOR EARTH MATERIALS. ABSTRACTS OF THE PAPERS ARE PRESENTED. IN THIS TEXT EQUATION OF STATE MEANS BEHAVIOR OF A MATERIAL UNDER GIVEN STATES AND BOUNDARY CONDITIONS REGARDLESS OF INTENSITY OF THE APPLIED STRESS.
AD-292 629 DIV. 13

*MATERIALS
SEPARATION

METHOD AND EQUIPMENT FOR CONCENTRATING ORE AND OTHER MATERIALS.
AD-292 218 DIV. 17

***MATERIALS**
SPACE ENVIRONMENTAL CONDITIONS

EFFECTS OF VACUUM, AS FOUND IN SPACE, ON PLASTICS, METALS, ELASTOMERS, OXIDES, AND LUBRICANTS. VACUUM TERMINOLOGY, PHYSICAL CONSTANTS AND CONCEPTS OF SPACE VACUUM.
AD-292 920 DIV. 14

***MATHEMATICAL ANALYSIS**

ANALYTIC CONTINUATION OF 4TH ORDER ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS IN TWO INDEPENDENT REAL VARIABLES ACROSS THE X-AXIS.
AD-293 211 DIV. 15

ANALYTIC CONTINUATION OF 4TH ORDER ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT REAL VARIABLES ACROSS AN ANALYTIC BOUNDARY (Y EQUALS MX).
AD-293 212 DIV. 15

MATHEMATICAL ANALYSIS AND DESIGN OF A HORIZONTAL I-BEAM VARIABLE FLANGE THICKNESS TO STRESSES.
AD-293 256 DIV. 17

***MATHEMATICAL ANALYSIS**
COMPUTERS

REACTIONS OF HEMOGLOBIN AND STEADY-STATES IN THE HUMAN RESPIRATORY SYSTEM: AN INVESTIGATION USING MATHEMATICAL MODELS AND AN ELECTRONIC COMPUTER.
AD-292 068 DIV. 16

***MATHEMATICAL LOGIC**

COMMUTATIVE AUTOMATA AND THEIR BEHAVIOR IS ASSOCIATED BETWEEN A CLASS OF MACHINES AND A SET OF WORDS AND A SET OF POINTS.
AD-292 912 DIV. 15

***MATHEMATICS**

REPORT ON RESEARCH DONE UNDER GRANT ON PSEUDO-CONCAVE AND -CONVEX COMPLEX SPACES; INCLUDES BIBLIOGRAPHY AND PERSONNEL INVOLVED.
AD-292 904 DIV. 15

HISTORY OF MATHEMATICAL STATISTICS RESEARCH AT THE AERONAUTICAL RESEARCH LABORATORIES.
AD-292 975 DIV. 30

ESTABLISHMENT OF A NEW FUNCTIONAL TRANSFORM IN ANALYSIS - THE MAXIMUM TRANSFORM.
AD-293 244 DIV. 15

***MATRIX ALGEBRA**

REALIZABILITY CONDITIONS OF SINGLE-CONTACT NETWORKS.
AD-293 103 DIV. 8

PASSIVITY DETERMINATION FOR GENERAL TRICHOTOMOUS SYSTEMS. A RECURSIVE TYPE OF PROCEDURE IS DEVELOPED.
AD-293 128 DIV. 22

SHORT CUT COMPUTATIONAL METHODS ARE DEVELOPED FOR SOLVING SYSTEMS WHOSE MATRICES MAY BE GENERALLY DESCRIBED AS BLOCK TRIANGULAR.
AD-293 474 DIV. 15

***MATRIX ALGEBRA**
OPERATORS (MATHEMATICS)

MATRICES OF LINEAR OPERATORS: HAMILTON-CAYLEY THEOREM EXTENDED TO MATRICES OF OPERATORS ON A BANACH SPACE B.
AD-292 918 DIV. 15

***MEASURE THEORY**

COMMUTATIVE AUTOMATA AND THEIR BEHAVIOR IS ASSOCIATED BETWEEN A CLASS OF MACHINES AND A SET OF WORDS AND A SET OF POINTS.
AD-292 912 DIV. 15

EXTENSION OF THEOREM THAT THE MEASURE ON THE COUNTABLE DIRECT PRODUCT OF REAL LINES WITH IDENTICAL GAUSSIAN MEASURES TRANSFORMS TO AN EQUIVALENT MEASURE UNDER A LINEAR TRANSFORMATION WITH A HILBERT-SCHMIDT OPERATOR.
AD-292 915 DIV. 15

***MEASUREMENT**

INTERNATIONAL SYSTEM OF UNITS OF MEASUREMENT OF PHYSICAL VALUES: THE BASIC UNITS APPEAR TO BE METER, KILOGRAM, SECOND, AMPERE, KELVIN DEGREE.
AD-292 650 DIV. 30

***MECHANICAL PROPERTIES**

SOME PHYSICAL AND CHEMICAL MEASUREMENTS ON ICE WITH REFERENCE TO THE HARD HUNT CORES: OXYGEN ANALYSIS, GAS PRESSURE, STRENGTH, AND TRITIUM DIFFUSION.
AD-292 089 DIV. 2

***MECHANICAL PROPERTIES**
MOLYBDENUM ALLOYS

EVALUATION OF PROCESSING METHODS ON MICROSTRUCTURE AND PROPERTIES OF MOLYBDENUM AND TUNGSTEN ALLOYS CONTAINING VARYING PROPORTIONS OF BORON, HAFNIUM, NIOBIUM, TITANIUM AND ZIRCONIUM.
AD-292 250 DIV. 17

***MECHANICAL PROPERTIES**
PRESSURE VESSELS

EVALUATION OF PROPERTIES OF HIGH STRENGTH ALLOY STEELS FOR USE IN LARGE SOLID PROPELLANT ROCKET MOTOR CASES.
AD-292 258 DIV. 27

***MECHANICAL PROPERTIES**
TUNGSTEN ALLOYS

EVALUATION OF PROCESSING METHODS ON MICROSTRUCTURE AND PROPERTIES OF MOLYBDENUM AND TUNGSTEN ALLOYS CONTAINING VARYING PROPORTIONS OF BORON, HAFNIUM, NIOBIUM, TITANIUM AND ZIRCONIUM.
AD-292 250 DIV. 17

***MECHANICS**

A DISCUSSION OF THE DUFFING PROBLEM.
AD-292 638 DIV. 15

***MEDICAL EQUIPMENT**

CONSTRUCTION OF A SMALL MG STRAIN GAGE FOR MEASURING CHANGES IN CARDIAC DIMENSIONS: PLETHYSMOGRAPHY OF THE HUMAN FINGER.
AD-293 132 DIV. 16

***MEDICAL EQUIPMENT**
ACCEPTABILITY

GALVANIC SKIN RESPONSE INSTRUMENTATION BASED ON SOLID STATE DESIGN PRINCIPLE.
AD-292 690 DIV. 16

***MELTING**

DEFORMATION MECHANISMS IN BRANCHED POLYETHYLENE MELTS. EXPERIMENTED DETERMINATION OF POINT TO POINT RESPONSE OF THE MELTS TO STRESS.
AD-293 405 DIV. 14

***MEMORY DEVICES**

METHOD OF CONSTRUCTING A LINEAR FERRITE MEMORY DEVICE AND A DEVICE IMPLEMENTING THE METHOD.
AD-292 204 DIV. 30

***MEMORY DEVICES**
COMPUTERS

FAILURE TOLERANCE IMPROVEMENT IN PARALLEL CORE MEMORIES BY MEANS OF WORD SPLIT TECHNIQUE.
AD-292 677 DIV. 19

***MERCURY**

CONSTRUCTION OF A SMALL MG STRAIN GAGE FOR MEASURING CHANGES IN CARDIAC DIMENSIONS: PLETHYSMOGRAPHY OF THE HUMAN FINGER.
AD-293 132 DIV. 16

***MESONS**

STRONG INTERACTION SYMMETRIES AND RELATIONS OF HYPERONS BETWEEN POLARIZATIONS ARE STUDIED.
AD-293 163 DIV. 9

***METABOLIC PRODUCTS**
MINERALS

THE RENAL EXCRETION OF MINERALS AND ITS POSSIBLE RELATION TO MINERAL BALANCE AND REQUIREMENTS (SODIUM, POTASSIUM, IRON, MAGNESIUM, AND PHOSPHORUS.)
AD-292 946 DIV. 16

***METABOLISM**
CARBOHYDRATES

THE EFFECT OF DRUGS ON CATECHOLAMINE CONTENT OF THE HEART AND ON THE PHOSPHORYLASE ACTIVITY OF THE HEART, LIVER, AND MUSCLE. THE EFFECT OF VARYING THE AMOUNTS OF UPN, AMP, ETC., ON CARBOHYDRATE METABOLISM IN CELL-FREE HEART HOMOGENATES.
AD-293 616 DIV. 16

***METABOLISM**
CARBOXYLIC ACIDS

THE TRICARBOXYLIC ACID CYCLE AND AUXILIARY REACTIONS SUCH AS THE GLYOXYLATE CYCLE, INDUCTION OF ISO CITRATE LYASE, ETC., IN BACTERIA.
AD-292 926 DIV. 16

THE METABOLISM OF C1 - COMPOUNDS AND OXALIC ACID, AND THE ENZYMES AND COENZYMES INVOLVED HAVE BEEN STUDIED IN MICROORGANISMS.
AD-293 150 DIV. 16

***METABOLISM**
EXPOSURE

THE EFFECT OF PROLONGED COLD EXPOSURE ON THE IN VITRO RESPIRATION AND ANAEROBIC GLYCOLYSIS OF RAT LIVER.
AD-293 187 DIV. 16

***METABOLISM**
FATTY ACIDS

STUDIES ON THE REGULATION OF LIPOGENESIS. PRELIMINARY EVIDENCE WAS REPORTED THAT LIPOGENESIS MAY BE REGULATED TO A GREAT EXTENT BY THE GENERATION OF AN INHIBITOR.
AD-293 135 DIV. 16

PERFECTION OF TECHNIQUES IN THE STUDY OF METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD. EXPERIMENTS WERE PERFORMED ON LIVER SLICES FROM MALE WISTAR RATS, 3 1/2 TO 6 MONTHS, FED ON A STANDARD SYNTHETIC DIET. OBSERVATIONS OF PHOSPHATE VERSUS BICARBONATE BUFFER, TIME COURSE OF ACETATE METABOLISM, CHOLESTEROL SYNTHESIS, FATTY ACID SYNTHESIS, AND THE EFFECT OF ACETATE CONCENTRATION ON THE PATTERN AND QUANTITY OF ACETATE METABOLISM ARE PRESENTED.
AD-293 173 DIV. 16

LIVER SLICES EXPOSED TO 0 TO 2 DEGREES C FROM 24 TO 48 HOURS SHOWED A GREATLY DEPRESSED CAPACITY TO SYNTHESIZE FATTY ACIDS FROM CARBOXYL LABELED ACETATE. THE CONVERSION TO CHOLESTEROL WAS NOT AFFECTED. ADDITION OF GLUCOSE ON CHOLESTEROL SYNTHESIS PRESENTED A MARKED INCREASE OF CHOLESTEROGENESIS WHEN THE COLD-EXPOSED ANIMAL WAS FLOODED WITH CARBOHYDRATE.
AD-293 174 DIV. 16

THE ADDITION OF GLUCOSE TO THE INCUBATION MEDIUM REVERSED THE CHANGES IN HEPATIC ACETATE METABOLISM THAT OCCURRED WITH COLD-EXPOSURE OR FASTING OR BOTH. THE EFFECTS OF INTERMEDIATES OF CARBOHYDRATE METABOLISM WERE STUDIED, BY USING SODIUM PYRUVATE. CHANGES WERE OBSERVED IN THE AMOUNT OF ACETATE-C14 INCORPORATED INTO CARBON FOURTEEN OXIDE (C14O2) FATTY ACID AND CHOLESTEROL BY METABOLIZING LIVER SLICES.
AD-293 175 DIV. 16

STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD.
AD-293 176 DIV. 16

EFFECT OF PYRUVATE ON ACETATE METABOLISM: EFFECT OF UNLABELED ACETATE ON HEPATIC C14 ACETATE METABOLISM: EFFECT OF KREBS CYCLE INTERMEDIATE ON ACETATE METABOLISM: EFFECT OF NACL ON HEPATIC ACETATE METABOLISM: COMPARISON OF EFFECT OF GLUCOSE AND PYRUVATE ON ACETATE METABOLISM: EFFECT OF BUTYRATE ON ACETATE METABOLISM: LIPOGENESIS IN LIVER HOMOGENATE SYSTEM.
AD-293 177 DIV. 16

THE EFFECT OF PYRUVATE ON THE OXIDATION OF ACETATE AND ON THE CONVERSION OF ACETATE INTO FATTY ACIDS IN RAT LIVER IS DISCUSSED. OBSERVATIONS OF BUTYRATE EFFECT ON ACETATE AND GLUCOSE METABOLISM ARE PRESENTED.
AD-293 178 DIV. 16

EFFECT OF SHORT CHAIN FATTY ACIDS ON HEPATIC ACETATE METABOLISM AND EFFECT OF KREBS CYCLE INTERMEDIATES ON HEPATIC ACETATE METABOLISM ARE PRESENTED.
AD-293 179 DIV. 16

EFFECTS OF KREBS CYCLE INTERMEDIATES AND SHORT CHAIN FATTY ACIDS ON HEPATIC ACID METABOLISM WERE INVESTIGATED.
AD-293 180 DIV. 16

EFFECTS OF SHORT CHAIN FATTY ACIDS ON ACETATE UTILIZATION COMPARISON OF HEPATIC METABOLISM OF BUTYRATE AND ACETATE. EFFECTS OF PROPIONATE AND ACETATE ON BUTYRATE-1-C14 METABOLISM AND ACETATE METABOLISM IN LIVER SLICES PREPARED FROM CHRONIC COLD EXPOSED RATS.
AD-293 181 DIV. 16

METABOLISM IN LIVER SLICES PREPARED FROM CHRONIC COLD-EXPOSED RATS IS PRESENTED. FATTY ACID METABOLISM OF COLD FASTED RATS; CARBOHYDRATE METABOLISM: INHIBITORY EFFECTS OF SHORT CHAIN FATTY ACID ON GLUCOSE METABOLISM: PROPIONATE, SUCCINATE, AND FASTING AND BLOOD SUGAR.
AD-293 182 DIV. 16

DETAILED STUDY OF THE RELATIONSHIP BETWEEN HEPATIC CARBOHYDRATE CONTENT AND ACETATE OXIDATION WAS INVESTIGATED. CARBOHYDRATE CONTENT DRASTICALLY REDUCED FASTING RATS BACK AT 25 DEGREES C AND ZERO DEGREES CENTIGRADE.
AD-293 183 DIV. 16

THE ABILITY OF LIVER TO SYNTHESIZE FATTY ACIDS FROM ACETATES WAS MARKEDLY DEPRESSED. A

CAUSAL RELATIONSHIP BETWEEN THE DEPRESSED LIPOGENESIS AND LOW LIVER CARBOHYDRATE WAS APPARENT. THE OXIDATION OF ACETATE SHOWN BY C(1)1(0)(2) PRODUCTION WAS NOT AFFECTED BY EXPOSURE FOR 1 TO 2 DAYS. THE EFFECT OF LOW ENVIRONMENTAL TEMPERATURES ON HEPATIC CHOLESTEROL SYNTHESIS IS COMPLEX.
AD-293 184 DIV. 16

STUDIES OF HEPATIC LIPOGENESIS TO RATS THAT HAVE LIVED IN THE COLD SEVERAL MONTHS. DEPRESSED LIPOGENESIS AND REDUCTION IN FATTY ACID SYNTHESIS WERE NOT THE RESULT OF A CURTAILED HEPATIC CARBOHYDRATE METABOLISM. OXIDATION OF ACETATE-1-C14 TO C14O(2) AND INCORPORATION OF ACETATE-1-C(14) INTO LONG CHAIN FATTY ACIDS WERE STUDIED.
AD-293 188 DIV. 16

THE MECHANISM BY WHICH THE CONCOMITANT METABOLISM OF CARBOHYDRATES INFLUENCES THE OXIDATION OF FATTY ACIDS HAS BEEN INVESTIGATED IN LIVER SLICES FROM NORMAL AND COLD-FASTED RATS.
AD-293 188 DIV. 16

***METAL COATINGS**
EFFECTIVENESS

FEATHER EXPOSURE DATA FOR HIGH-TEMPERATURE COATINGS ON CHROMIUM HOT-WORK TOOL STEELS. A NICKEL-ZINC COATING WAS MOST EFFECTIVE FOR PROTECTION FROM CORROSION. PRE-EXPOSURE FROM 500 TO 1000 F FOR 150 HR.
AD-293 219 DIV. 14

***METAL PLATES**

HYPERVELOCITY IMPACT PHENOMENA. SPALLATION OF THIN METAL PLATES.
AD-293 457 DIV. 22

***METAL PLATES**
AERODYNAMIC HEATING

LEADING EDGE TEMPERATURE OF A FLAT PLATE SUBJECTED TO AERODYNAMIC HEATING.
AD-292 601 DIV. 9

***METAL SEALS**

DEVELOPMENT OF COMPOSITE MATERIALS FOR USE AS STATIC AND DYNAMIC SEALS; CRYOGENIC TO 2000 F UP TO 500 PSI; RECIPROCATING SHAFTS; SEALING CABINS OF SPACESHIPS.
AD-291 984 DIV. 14

***METALLIC COMPOUNDS**

SYNTHESIS OF METALLIC TI FROM ITS OXIDES AND CHLORIDES; VACUUM APPARATUS; HIGH FREQUENCY ELECTRIC CHARGES; CONTINUOUS PROCESS.
AD-292 653 DIV. 17

***METALLURGY**

METAL SCIENCE AND HEAT TREATMENTS OF METALS (SELECTED ARTICLES). EFFECT OF HIGH TEMPERATURE PLASTIC DEFORMATION ON MECHANICAL PROPERTIES OF NICKEL-BASE ALLOYS; INVESTIGATION OF THE POLYGONIZATION OF MO BY MEANS OF HIGH TEMPERATURE METALLOGRAPHY.
AD-292 186 DIV. 17

***METALORGANIC COMPOUNDS**
SYNTHESIS

SYNTHESIS ORGANOSILICON MONOMERS WITH NITRILE GROUPS; SILANES; TRICHLOROSILANE ADDITION TO CYCLOHEXENECARBONITRILE.
AD-292 663 DIV. 4

***METALS**

ABSTRACTS OF ARTICLES ON HIGH STRENGTH ALLOYS; LIGHT METALS; NONMETALLICS; AND REFRACTORY METALS.
AD-293 270 DIV. 17

***METALS**
BIBLIOGRAPHY

ABSTRACTS SELECTED REPORTS IN DEFENSE METALS INFORMATION CENTER; HEAT RESISTANT ALLOYS; METALS; REFRACTORY MATERIALS; COATINGS.
AD-291 965 DIV. 32

***METALS**
CHEMICAL IMPURITIES

DETERMINATION OF GASES (O+H) IN ALKALI METALS AND THEIR ALLOYS BY HG EXTRACTION; SAMPLE PREPARATION FOR VACUUM EXTRACTION.
AD-292 618 DIV. 8

***METALS**
IMPACT SHOCK

MEASUREMENT OF COUPLING BETWEEN A STEEL SPHERE AND METAL OR PLASTIC RODS AS THE SPHERE IMPACTS THE ROD ENDS.
AD-293 280 DIV. 25

***METALS**
LOW PRESSURE RESEARCH

EFFECTS OF VACUUM; AS FOUND IN SPACE; ON PLASTICS; METALS; ELASTOMERS; OXIDES; AND LUBRICANTS. VACUUM TERMINOLOGY; PHYSICAL CONSTANTS AND CONCEPTS OF SPACE VACUUM.
AD-292 930 DIV. 14

***METALS**
MECHANICAL PROPERTIES

EFFECT OF COMPOSITION AND GASEOUS MEDIA ON ANTIWEAR PROPERTIES OF PETROLEUM LUBRICATING OILS; FRICTION; OXIDATION INHIBITORS; HIGH TEMPERATURE AND PRESSURE.
AD-292 234 DIV. 14

ELASTIC PROPERTIES RESEARCH. INFLUENCE OF GRAIN BOUNDARY RELAXATION ON ELASTICITY OF POLYCRYSTALLINE AGGREGATES; MODULUS COMPENSATED ACTIVATION ENERGY FOR CREEP; ELASTIC AND PLASTIC PROPERTIES OF PURE POLYCRYSTALLINE COPPER; EFFECT OF FERROMAGNETISM ON ELASTIC AND PLASTIC PROPERTIES OF FE, CO AND NI.
AD-292 798 DIV. 17

***METALS**
PRODUCTION

DEVELOPMENT OF FIBER-REINFORCED METALS AND ALLOYS WITH HIGH STRENGTH-TO-WEIGHT RATIOS. HIGH ELASTIC MODULI; HOT EXTRUSION; FABRICATION; AL-BE ALLOYS.
AD-293 259 DIV. 17

***METALS**
SCALE

CLEANING SCALE FROM ROLLED METAL BY PASSING THE METAL THROUGH A BATH WHERE IT IS SUBJECTED TO POWERFUL ELECTROHYDRAULIC SHOCKS.
AD-292 181 DIV. 26

***METALS**
THERMODYNAMICS

HEAT TRANSFER ON THE SURFACE OF A BODY BEING MELTED IN A SUPERSONIC STREAM WITH MOLTEN METAL FED THROUGH POROUS WALL SURFACE; EFFECT OF LIQUID FILM.
AD-292 236 DIV. 25

***METEOROLOGICAL DATA**

INSTRUCTION FOR PROCESSING RAW UPPER AIR DATA TO ESTABLISH CLIMATOLOGIES AT CONSTANT ALTITUDE LEVELS.
AD-292 115 DIV. 2

DIRECT MEASUREMENT OF THE MERIDIONAL CIRCULATION IN THE STRATOSPHERE DURING THE IGY.
AD-292 145 DIV. 2

A DIGITAL METEOROLOGICAL DATA-ACQUISITION SYSTEM NOCTURNAL LOW LEVEL JET.
AD-292 167 DIV. 2

***METEOROLOGICAL RADAR**

A DIGITAL METEOROLOGICAL DATA-ACQUISITION SYSTEM NOCTURNAL LOW LEVEL JET.
AD-292 167 DIV. 2

UTILITY OF RADAR EQUIPMENT IN MEASURING SURFACE PRECIPITATION; CORRELATION BETWEEN RAWAR VARIABLE AND ACTUAL RAINFALL QUANTITIES BY MEANS OF RAINDROP-SIZE DISTRIBUTION.
AD-293 250 DIV. 2

***METEOROLOGY**

PRESENTS WIND SCALES FOR SURFACE AND UPPER AIR FOR USE IN ANALYSIS OF METEOROLOGICAL PLOTTING MAPS.
AD-292 045 DIV. 2

DIRECT MEASUREMENT OF THE MERIDIONAL CIRCULATION IN THE STRATOSPHERE DURING THE IGY.
AD-292 145 DIV. 2

AIR DISPERSION OF TOXIC ROCKET EXHAUST.
AD-293 432 DIV. 25

AN OBJECTIVE METHOD FOR FORECASTING STRONG AND GUSTY WINDS AT PLATTSBURGH AF BASE, NEW YORK.
AD-293 607 DIV. 2

***METEOROLOGY**
USSR

FOUR STUDIES: THE APPARENT FREQUENCY OF THE APPEARANCE OF NOCTILUCENT CLOUDS, CERTAIN CASES O THE APPEARANCE OF BRIGHT NOCTILUCENT CLOUDS PHOTOMETRIC AND COLORIMETRIC OBSERVATIONS; THE ABSOLUTE PHOTOMETRY OF OBSERVATIONS; THE ABSOLUTE PHOTOMETRY OF THE TWILIGHT SKY AND NOCTILUCENT CLOUDS.
AD-292 196 DIV. 2

***METEORS**

SELECTED ARTICLES ON RADAR OBSERVATION OF METEORS AND METEORIC TRACES.
AD-292 219 DIV. 8

***METEORS**
IRON

CHLORINE 36 AND ARGON 39 IN METEORITES AND THE EXPOSURE AND TERRESTRIAL AGES OF IRON METEORITES.
AD-292 913 DIV. 2

***METHANOLS**

H GENERATION FROM METHANOL FOR GENERATING ELECTRICITY H2-O2 FUEL CELL SUBMARINES; CATALYSIS; THERMODYNAMICS; ENTHALPY; PHYSICAL PROPERTIES; CO AND CO2 REMOVAL.
AD-292 273 DIV. 7

***METHYL HYDRAZINES**
PHARMACOLOGY

THE TOXICITY AND PHARMACOLOGICAL EFFECTS OF 1;1-DIMETHYLHYDRAZINE ON THE CARDIOVASCULAR, CENTRAL NERVOUS, AND AUTONOMIC NERVOUS SYSTEMS HAVE BEEN INVESTIGATED IN MICE, RATS, DOGS, AND MONKEYS.
AD-292 689 DIV. 16

***MICROMINIATURIZATION (ELECTRONICS)**

MICROMINIATURIZATION OF PORTIONS OF THE NAVYK-1 COMPUTER. FEASIBILITY OF CONSTRUCTING THE LOGIC SECTION OF THE COMPUTER WITH INTEGRATED CIRCUIT ELEMENTS.
AD-292 317 DIV. 30

DEVELOPMENT OF COMPLIANT BRIDGING TECHNIQUES; SUBSTRATE FABRICATION AND INTERCONNECTION DEPOSITION FOR MICROMINIATURIZED CIRCUITS.
AD-293 146 DIV. 8

***MICROORGANISMS**

CYTOCHEMICAL ANALYSES OF THE FUNGUS, ASPERGILLUS NIGER REVEALED THE PRESENCE OF CHITIN AND CELLULOSE. ADAPTATION OF STANDARD CYTOCHEMICAL PROCEDURES WERE USED FOR IDENTIFICATION OF CELL WALL MATERIAL IN THE BACTERIA PSEUDOMONAS AERUGINOSA AND ESCHERICHIA COLI WHICH CONTAMINATE AVIATION FUELS. INFORMATION CONCERNING THE NATURE AND LOCATION OF THE RESISTANT SUBSTANCES WHICH MAKE UP THEIR CELL WALLS IS USEFUL IN DEVELOPMENT OF METHODS OF TREATMENT IMPORTANT TO CONTROL OF MICROORGANISMS.
AD-293 226 DIV. 16

***MICROWAVE AMPLIFIERS**

A TWO-HELIX FORWARD WAVE AMPLIFIER-OSCILLATOR-MIXER-AMPLIFIER CAPABLE OF OPERATION FROM 50 TO 60 GC.
AD-292 135 DIV. 8

A LOW-NOISE E-BAND AMPLIFIER WITH AN ELECTRICALLY-TUNABLE BANDPASS FILTER EMPLOYING YIG SPHERES.
AD-292 794 DIV. 8

***MICROWAVE COMMUNICATION SYSTEMS**

A THEORETICAL ANALYSIS OF CERENKOV POWER GENERATION FOR VARIOUS BEAM GEOMETRIES AND SOME EXPERIMENTAL TECHNIQUES.
AD-292 966 DIV. 5

***MICROWAVE EQUIPMENT**

MICROWAVE CHARACTERISTICS AND APPLICATIONS OF FERROELECTRIC CERAMICS.
AD-292 131 DIV. 8

CONVERGENT GUN MICROWAVE PHOTOTUBES.
AD-293 149 DIV. 8

***MICROWAVE OSCILLATORS**

A TWO-HELIX FORWARD WAVE AMPLIFIER-OSCILLATOR-MIXER-AMPLIFIER CAPABLE OF OPERATION FROM 50 TO 60 GC.
AD-292 135 DIV. 8

OCTAVE-TUNABLE TUNNEL DIODE OSCILLATORS.
AD-293 216 DIV. 8

***MICROWAVES**
ABSORPTION

EVALUATION OF MATRIX ELEMENTS IN CRYSTALLINE FIELD THEORY.
AD-292 081 DIV. 25

***MICROWAVES**
SCATTERING

MEASUREMENTS OF THE DISTRIBUTION OF ELECTRONS IN THE F-REGION OF THE IONOSPHERE BY OBSERVING THE WEAK INCOHERENT BACKSCATTER SIGNAL.
AD-292 730 DIV. 8

***MILITARY COMMUNICATIONS**

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES, INTER-CONTINENTAL AREAS AND THE SUPPORT REGIONS.
AD-291 999 DIV. 5

DEVELOPMENT OF A HIGH FREQUENCY DIGITAL COMMUNICATION SYSTEM.
AD-292 094 DIV. 5

***MILITARY OPERATIONS**

NON-MILITARY APPLICATIONS OF OPERATIONS RESEARCH.
AD-293 471 DIV. 18

***MILITARY PERSONNEL**
EFFECTIVENESS

AN ASSESSMENT OF CAPABILITIES OF FLEET PERSONNEL IN ORDER TO DEVISE AND REFINE CURRICULUM REQUIREMENTS FOR ON-THE-JOB TRAINING OF MISSILE TECHNICIANS.
AD-293 239 DIV. 23

***MILITARY PROCUREMENT**
ECONOMICS

PROBLEM OF ECONOMIC EFFICIENCY IN MILITARY PROCUREMENT AND CONTRACTING.
AD-293 424 DIV. 32

***MILITARY RESEARCH**
EFFECTIVENESS

DISCUSSION ON SOME OF THE ISSUES INVOLVED IN THE CONDUCT OF MILITARY RESEARCH AND DEVELOPMENT.
AD-292 652 DIV. 30

***MINERALS**

EFFECTIVENESS OF SHEARING STRESSES IN ACCELERATING SOLID PHASE REACTIONS AT LOW TEMPERATURES AND HIGH PRESSURES; P-T DIAGRAM; TRANSITION KINETICS.
AD-292 309 DIV. 25

***MINERALS**
METABOLIC PRODUCTS

THE RENAL EXCRETION OF MINERALS AND ITS POSSIBLE RELATION TO MINERAL BALANCE AND REQUIREMENTS (SODIUM, POTASSIUM, IRON, MAGNESIUM, AND PHOSPHORUS.)
AD-292 946 DIV. 16

***MINIATURE ELECTRONIC EQUIPMENT**

RESULTS OF A TANK COMPUTER MINIATURIZATION STUDY TO SIMPLIFY AND MINIATURIZE ELECTRONIC ANALOG TANK BALLISTIC COMPUTERS.
AD-293 210 DIV. 30

***MINING ENGINEERING**

ELECTROHYDRAULIC EFFECT, APPLICATION (MINING) HYDRAULIC PRESSURE; HIGH VOLTAGE PULSED DISCHARGE; ELECTRIC PIERCING OF LIQUIDS.
AD-292 462 DIV. 17

***MIRRORS**

A ONE METRE MIRROR FOR MOON TRACKING AND PHOTOGRAPHY.
AD-292 741 DIV. 2

***MIXER TUBES**

A TWO-HELIX FORWARD WAVE AMPLIFIER-OSCILLATOR-MIXER-AMPLIFIER CAPABLE OF OPERATION FROM 50 TO 60 GC.
AD-292 135 DIV. 8

***MOISTURE**

THEORIES OF WATER MOVEMENT IN SOILS.
AD-292 941 DIV. 2

***MOLECULAR STRUCTURE**

ANALYTICAL METHODS FOR DETERMINING MOLECULAR STRUCTURE, CHARACTERIZATION OF ORGANIC COMPOUNDS; MASS SPECTROMETRY; VIBRATIONAL SPECTROSCOPY; THERMAL ANALYSIS; POLYMERS; SYNTHESIS OF ALLOWYES-METHYLVALERALDEHYDE, METHYL HEPTANAL.
AD-292 249 DIV. 4

***MOLECULAR STRUCTURE**
FREQUENCY

FREQUENCY ASSIGNMENTS 1/650 TO 1/250 CM SPECTRAL REGION FOR 279 BENZENE DERIVATIVES; RAMAN SPECTRA; IR SPECTRA; RING DEFORMATION.
AD-292 627 DIV. 4

***MOLYBDENUM ALLOYS**
MANUFACTURING METHODS

EVALUATION OF PROCESSING METHODS ON MICROSTRUCTURE AND PROPERTIES OF MOLYBDENUM AND TUNGSTEN ALLOYS CONTAINING VARYING PROPORTIONS OF BORON, HAFNIUM, NIOBIUM, TITANIUM AND ZIRCONIUM.
AD-292 250 DIV. 17

***MOLYBDENUM ALLOYS**
MECHANICAL PROPERTIES

METAL SCIENCE AND HEAT TREATMENTS OF METALS (SELECTED ARTICLES). EFFECT OF HIGH TEMPERATURE PLASTIC DEFORMATION ON MECHANICAL PROPERTIES OF NICKEL-BASE ALLOYS; INVESTIGATION OF THE POLYGONIZATION OF MO BY MEANS OF HIGH TEMPERATURE METALLOGRAPHY.
AD-292 186 DIV. 17

***MOLYBDENUM ALLOYS**
OXIDATION

EFFECT OF VARYING TEMPERATURE, PARTIAL PRESSURE OF OXYGEN, AND ALLOY COMPOSITION ON SELECTIVE OXIDATION OF MOLYBDENUM-HAFNIUM ALLOYS IN AN ATMOSPHERE OF HYDROGEN AT 1200 AND 1300 C, USING ALLOYS WITH 1.0, 5.0, 15.0, AND 25.0 ATOM PERCENT HAFNIUM.
AD-293 158 DIV. 17

***MONITORS**

REMOTE MONITORING AND CONTROL APPARATUS FOR LARGE DISPERSED SYSTEMS.
AD-292 195 DIV. 5

***MONOMOLECULAR FILMS**

FORCE-AREA STUDY OF MIXED FILMS OF CATALASE AND OVOMUCOID; WILHELMY FILM BALANCE MEASUREMENTS; MOLECULAR AREA DETERMINATIONS.
AD-292 922 DIV. 4

***MOON**

SPECTROPHOTOMETRIC STUDY OF THE LUNAR SURFACE.
AD-292 765 DIV. 2

***MORPHINE**
TOXICITY

EXPERIMENTS WERE PERFORMED TO DETERMINE WHETHER ADAPTATION TO COLD ALTERS THE EFFECTS OF MORPHINE ON THE MINUTE VOLUME AND OXYGEN CONSUMPTION OF THE UNANESTHETIZED RAT, AND ON THE MEDIAN EFFECTIVE ANALGESIC AND THE MEDIAN LETHAL DOSES OF MORPHINE IN THE MICE.
AD-293 134 DIV. 16

***MUCOUS MEMBRANES**
INTESTINE

SEROLOGICAL STUDY ON THE SERUM AND RECTAL MUCUS ASPIRATED ALMOST PURELY FROM THE RECTAL CAVITY OF PATIENTS WITH SHIGELLOSIS AND WITH SALMONELLOSIS USING A RUMANOSCOPE. COMPARATIVE STUDIES OF AN AGGLUTINATION, A HEM-AGGLUTINATION AND A LATEX AGGLUTINATION TEST SHOWED THAT THE HEM-AGGLUTININ TITER AND THE LATEX AGGLUTYNIN TITER WERE HIGHER THAN THE AGGLUTININ TITER. THE LATEX AGGLUTINATION TEST OFFERS THE ADVANTAGE OF YIELDING EXACT, READABLE RESULTS WITHIN TWO HOURS OVER BOTH THE AGGLUTINATION TEST AND THE HEM-AGGLUTINATION TEST IN WHICH READING CAN BE MADE ONLY AFTER TWENTY-FOUR HOURS.
AD-292 261 DIV. 16

***MUSCLES**
CONTROL

A VARIABLE IMPEDANCE MUSCLE STIMULATOR FOR INVESTIGATION OF THE SERVO PROPERTIES OF THE GASTROCNEMIUS MUSCLE REFLEX ARC OF THE CAT IS DESCRIBED.
AD-293 468 DIV. 8

***MUTATIONS**
BACTERIA

A MUTANT BACTERIA WITH THE ABILITY TO MAKE UNUSUALLY LARGE QUANTITIES OF THE ENZYME BETA-GALACTOSIDASE.
AD-293 289 DIV. 16

***NAVAL OPERATIONS**

NON-MILITARY APPLICATIONS OF OPERATIONS RESEARCH.
AD-293 471 DIV. 18

***NAVAL VESSELS**

EFFECT OF HULL VIBRATIONS OF VARIOUS SIZE ANTI-PITCHING FIN CONFIGURATIONS.
AD-293 491 DIV. 31

***NAVIGATION**

ACTIVITY REPORT ON AIRPORT FACILITY INCLUDING TRAFFIC CONTROL, DISPLAY SYSTEMS, LIGHTING, COMMUNICATIONS, AND LANDING SYSTEMS.
AD-292 072 DIV. 1

***NEBULAE**

ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE, GLOBULAR STAR CLUSTERS, WOLF-RAYET STAR OF GAMMA 2 VELORUM, H/HE RATIO IN NO 9644A, EMISSION NEBULOSITIES IN SMALL AND LARGE MAGELLANIC CLOUDS, SPECTRUM OF NGC 7009.
AD-292 440 DIV. 2

***NEUTRON COUNTERS**

FLUX AND SPECTRAL MEASUREMENTS OF PRIMARY AND MODERATED NEUTRON SOURCES.
AD-292 073 DIV. 20

***NEUTRON DETECTORS**
STANDARDIZATION

STANDARDIZATION OF THE HURST RADSAN NEUTRON DETECTOR.
AD-292 126 DIV. 6

***NEUTRON FLUX DENSITY**
MEASUREMENT

FLUX AND SPECTRAL MEASUREMENTS OF PRIMARY AND MODERATED NEUTRON SOURCES.
AD-292 073 DIV. 20

***NICKEL ALLOYS**

MECHANICAL PROPERTIES OF SPOT WELDED, BUTT WELDED, AND RIVETED JOINTS OF HASTELLOY B35 AND HAYNES ALLOY NO. 25 NI BASE ALLOYS.
AD-293 096 DIV. 17

SEVERITY AND ELIMINATION OF THE BAUSCHINGER EFFECT IN 10% COLD WORKED HASTELLOY R-235 NI ALLOY; MECHANICAL PROPERTIES; PLASTIC DEFORMATION.
AD-293 097 DIV. 17

***NICKEL ALLOYS**
CASTING

INFLUENCE OF MOLD WALL THICKNESS ON THE QUALITY OF INGOTS CAST FROM NI-BASED ALLOYS; DENSITY; MOLDING; CRACKING; ULTRASONIC MONITORING.
AD-292 612 DIV. 17

***NICKEL ALLOYS**
HARDENING

DISPERSION-STRENGTHENED ALLOYS; SYSTEMS NI-TIB2 AND NI-TIC; DIFFUSION; LATTICES; DILUTE ALLOYS; INTERMETALLIC DISPERSION; ELECTRON MICROSCOPY.
AD-293 232 DIV. 17

***NICKEL ALLOYS**
HEAT TREATMENT

EFFECT OF 1500 F EXPOSURE ON THE MECHANICAL PROPERTIES OF 10% COLD WORKED HASTELLOY R-235 NI ALLOY STRIPS.
AD-293 100 DIV. 17

***NICKEL ALLOYS**
MECHANICAL PROPERTIES

METAL SCIENCE AND HEAT TREATMENTS OF METALS (SELECTED ARTICLES). EFFECT OF HIGH TEMPERATURE PLASTIC DEFORMATION ON MECHANICAL PROPERTIES OF NICKEL-BASE ALLOYS; INVESTIGATION OF THE POLYGONIZATION OF MO BY MEANS OF HIGH TEMPERATURE METALLOGRAPHY.
AD-292 186 DIV. 17

ULTIMATE SHEAR STRENGTH OF 1/8 AND 5/32 INCH DIAMETER MONEL METAL, NICKEL BASE ALLOY, RIVET WIRE WITH STEEL SHEAR JIGS; YIELD STRENGTH IN AL ALLOY SHEET.
AD-292 294 DIV. 17

***NICKEL ALLOYS**
PREPARATION

AL203 WHISKERS FOR REINFORCING 80-20 NI-CR ALLOY AND IRON; TENSILE PROPERTIES; BONDING; H-REDUCED FE; FIBER LOADING.
AD-291 917 DIV. 14

***NICKEL PLATING**

HYDROGEN RELIEF OF NICKEL AND CHROMIUM ELECTROPLATED HOT-WORK DIE STEELS - VASCOJET 1000 (H-11).
AD-292 290 DIV. 17

***NICKEL PLATING**
STEEL

WEATHER EXPOSURE DATA FOR HIGH-TEMPERATURE COATINGS ON CHROMIUM HOT-WORK TOOL STEELS. A NICKEL-ZINC COATING WAS MOST EFFECTIVE FOR PROTECTION FROM CORROSION. PRE-EXPOSURE FROM 500 TO 1000 F FOR 150 HR.
AD-293 219 DIV. 14

***NIOBIUM ALLOYS**

PHASE COMPOSITION OF OXIDES OF NB BASE ALLOYS;

TI, V, CR, MO, & ZR OXIDES; OXIDATION; CRYSTAL STRUCTURE.
AD-292 211 DIV. 17

*NITROBENZENES
REDUCTION

ELECTROREDUCTION OF AROMATIC NITRO COMPOUNDS IN NONAQUEOUS SOLUTIONS. PART I. REDUCTION OF NITROBENZENES IN ACID LIQUID AMMONIA SOLUTIONS.
AD-293 486 DIV. 4

*NITROGEN

NUCLEAR RELAXATION OF N-14 BY QUADRUPOLE INTERACTION IN MOLECULAR LIQUIDS.
AD-293 441 DIV. 20

*NITROGEN
PHYSIOLOGY

CONSIDERABLE NITROGEN AND AMINO ACIDS ARE EXCRETED UNDER CONDITIONS CAUSING PROFUSE SALIVA. THESE NITROGEN LOSSES HAVE BEEN IGNORED IN MOST STUDIES ON BALANCE.
AD-292 987 DIV. 16

*NITROGEN COMPOUNDS

DETONABILITY OF N2O AT TEMPERATURES FROM 23 TO 210 C AND PRESSURES FROM 31.4 TO 207.1 ATM IN A HIGH PRESSURE DETONATION TUBE.
AD-292 310 DIV. 24

*NOISE
SUPPRESSORS

THE MERITS OF A METHOD FOR CLASSIFYING THE GROSS ACOUSTICAL PERFORMANCE OF NOISE SUPPRESSORS.
AD-292 702 DIV. 25

*NON-LINEAR DIFFERENTIAL EQUATIONS

AN INVESTIGATION OF THE APPLICATION OF NON-LINEAR MODELING WITH FUNCTIONS OF A SPECIAL TYPE
AD-292 106 DIV. 15

*NONLINEAR SYSTEMS

THE USE OF THE TECHNIQUE OF LINEAR BOUNDS FOR APPLYING THE DIRECT METHOD OF LIAPUNOV TO A CLASS OF NONLINEAR AND TIME VARYING SYSTEMS IS STUDIED.
AD-292 302 DIV. 8

NONLINEAR THEORY OF ELASTIC SHELLS UNDER THE KIRCHHOFF HYPOTHESIS; DETERMINATION OF SUITABLE STRAIN MEASURES AND THE DERIVATION OF CONSTITUTIVE EQUATIONS.
AD-292 978 DIV. 25

*NORTHERN HEMISPHERE

RADIATION BALANCE OF THE NORTHERN HEMISPHERE.
AD-292 217 DIV. 20

*NOZZLES

NONEQUILIBRIUM FLOW OF AIR IN NOZZLES; KINETICS OF ESTABLISHING EQUILIBRIUM BETWEEN PROGRESSIVE AND INERT DEGREES OF FREEDOM OF MOLECULES AT HIGH TEMPERATURES.
AD-292 228 DIV. 9

*NUCLEAR EXPLOSIONS

RHODIUM-102 HIGH ALTITUDE TRACER EXPERIMENT. A NUCLEAR EXPLOSION OVER JOHNSTON ISLAND.
AD-291 927 DIV. 20

TESTS TO OBTAIN VEGETATION REFLECTANCE DATA FROM 250 TO 2000 MILLIMICRONS IN ORDER TO DETERMINE THE EFFECT OF UNDERGROUND NUCLEAR EXPLOSIONS ON VEGETATION.
AD-292 986 DIV. 20

*NUCLEAR EXPLOSIONS
SEISMOGRAPHS

LONG RANGE SEISMIC MEASUREMENTS PROGRAM FILM SEISMOGRAMS OF THE HYRAX UNDERGROUND NUCLEAR EXPLOSION.
AD-293 462 DIV. 6

LONG RANGE SEISMIC MEASUREMENTS PROGRAM FILM SEISMOGRAMS MADE IN CONNECTION WITH THE HARDHAT UNDERGROUND NUCLEAR EXPLOSION.
AD-293 469 DIV. 6

VISUAL ANALYSIS OF SEISMOGRAMS AS RECORDED AT LONG RANGE SEISMIC MEASUREMENT SITES DURING THE AARDVARK UNDERGROUND NUCLEAR EXPLOSION EVENT.
AD-293 482 DIV. 6

VISUAL ANALYSIS OF SEISMOGRAMS AS RECORDED AT LONG RANGE SEISMIC MEASUREMENT SITES DURING THE CHINCHILLA UNDERGROUND NUCLEAR EXPLOSION EVENT.
AD-293 483 DIV. 6

*NUCLEAR PHYSICS

HEAVY PARTICLE INTERACTIONS.
AD-292 078 DIV. 20

*NUCLEAR POWER PLANTS

FEASIBILITY OF A NUCLEAR SPACE POWER SYSTEM THAT UTILIZES A THERMIONIC RADIATION/ AN ELECTRICALLY HEATED REFRACTORY METAL (CB-1ZR) TEST LOOP/ REFRACTORY METAL PROPERTIES/ LIQUID LITHIUM.
AD-293 483 DIV. 7

*NUCLEAR POWER PLANTS
USSR

A PROPOSED EXPERIMENTAL PULSED REACTOR.
AD-291 904 DIV. 20

*NUCLEAR PROPULSION
SPACE FLIGHT

CONTROLLED FUSION PROPULSION FOR SPACE APPLICATIONS - SYMPOSIA PAPER.
AD-293 405 DIV. 12

*NUCLEAR SPINS
MOLECULES

NUCLEAR RELAXATION OF N-14 BY QUADRUPOLE INTERACTION IN MOLECULAR LIQUIDS.
AD-293 441 DIV. 20

*NUCLEIC ACIDS

CALCULATION OF THE ENERGY BANDS OF ADENINE, THYMINE, GUANINE, AND CYTOCINE NUCLEOTIDES/ DISCUSSION OF BAND STRUCTURES.
AD-293 268 DIV. 25

*NUCLEOTIDES

CALCULATION OF THE ENERGY BANDS OF ADENINE, THYMINE, GUANINE, AND CYTOCINE NUCLEOTIDES/ DISCUSSION OF BAND STRUCTURES.
AD-293 268 DIV. 25

*NUMBER THEORY

PROOF THAT THE MINIMUM 'DISTANCE' OF A NON-NEGATIVE NUMBERS OCCURS IF THEY ARE IN A CERTAIN SYMMETRY. IT USED TO OBTAIN MINIMAL OR MAXIMAL FUNDAMENTAL FREQUENCY OF A VIBRATING STRING LOADED WITH DISCRETE WEIGHTS.
AD-292 914 DIV. 15

RESEARCH ON THE MECHANIZATION OF THE THEORY OF NUMBERS.
AD-292 980 DIV. 15

*NUMBERS
GENERATORS

CALCULATIONS WITH PSEUDO-RANDOM NUMBERS.
AD-292 698 DIV. 15

*NUMERICAL ANALYSIS

DEVELOPMENT OF NUMERICAL MODELS FOR WEATHER PREDICTION.
AD-291 925 DIV. 2

TRANSFORMATION OF EARTH CO-ORDINATES IN RADAR DATA INPUT SYSTEMS.
AD-293 242 DIV. 15

THE AVERAGE HORIZONTAL WIND DRIVEN MASS TRANSPORT OF THE ATLANTIC FOR FEBRUARY AS OBTAINED BY NUMERICAL METHODS.
AD-293 427 DIV. 2

*NUMERICAL METHODS AND PROCEDURES

DESCRIPTION AND COMPARISON OF COMPUTER METHODS OF CIRCUIT ANALYSIS.
AD-292 321 DIV. 8

VON NEUMANN'S ALGORITHM FOR SOLVING A MATRIX GAME INPUT ON AN IBM 7090 AND COMPARED WITH THE SIMPLEX METHOD AND 'FICTITIOUS PLAY'. THE ALGORITHM IS SHOWN TO BE SENSITIVE TO DOMINANCE IN THE PAYOFF MATRIX.
AD-292 691 DIV. 15

CALCULATIONS WITH PSEUDO-RANDOM NUMBERS.
AD-292 698 DIV. 15

SHORT CUT COMPUTATIONAL METHODS ARE DEVELOPED FOR SOLVING SYSTEMS WHOSE MATRICES MAY BE GENERALLY DESCRIBED AS BLOCK TRIANGULAR.
AD-293 474 DIV. 15

*NUMERICAL METHODS AND PROCEDURES
COMPUTERS

RESEARCH ON THE MECHANIZATION OF THE THEORY OF NUMBERS.
AD-292 980 DIV. 15

*NUMERICAL METHODS AND PROCEDURES
ERRORS

EFFECT OF DEGRADED OPERATIONAL MODES ON THE ACCUMULATION OF ERRORS IN NUMERICAL INTEGRATION/ TRAPEZOIDAL RULE.
AD-292 678 DIV. 30

*NUMERICAL METHODS AND PROCEDURES
SAMPLING

THE UTILITY OF STATISTICS OF RANDOM NUMBERS.
AD-293 245 DIV. 15

*OCEAN MODELS

RAY ACOUSTICAL MODEL OF THE OCEAN USING A DEPTH-SOUND SPEED PROFILE WITH A CONTINUOUS FIRST DERIVATIVE.
AD-291 909 DIV. 25

*OCEAN WAVES

LINEAR SUPERPOSITION PRINCIPLES ARE APPLIED TO THE IRREGULAR MOTIONS OF NON-VENTILATED, RIGIDRAL HYDROFOIL SYSTEMS IN RANDOM SEAS.
AD-292 985 DIV. 9

WEATHER MAPS ANALYZED TO DEVELOP NUMERICAL WAVE FORECASTING PROCEDURES FOR THE NORTH ATLANTIC OCEAN.
AD-293 451 DIV. 2

*OCEANOGRAPHY

A CRITICAL REVIEW OF THE PROPERTIES OF THE VERTICALLY INTEGRATED WIND-DRIVEN CIRCULATION IN OCEAN MODELS BASED ON THE LINEARIZED, STEADY-STATE HYDRODYNAMIC EQUATIONS OF MOTION.
AD-293 428 DIV. 2

*OCEANS
MODEL TESTS

A CRITICAL REVIEW OF THE PROPERTIES OF THE VERTICALLY INTEGRATED WIND-DRIVEN CIRCULATION IN OCEAN MODELS BASED ON THE LINEARIZED, STEADY-STATE HYDRODYNAMIC EQUATIONS OF MOTION.
AD-293 428 DIV. 2

*OILS

VISCOSITY OF MIXTURES OF OILS (SILICONE AND PETROLEUM); CONSISTENT LUBRICANTS BY THICKENING WITH LI STEARATE AND GENESIN.
AD-292 302 DIV. 14

EFFECT OF COMPOSITION AND GASEOUS MEDIA ON ANTIWEAR PROPERTIES OF PETROLEUM LUBRICATING OILS; FRICTION; OXIDATION INHIBITORS; HIGH TEMPERATURE AND PRESSURE.
AD-292 234 DIV. 14

*OPERATORS (MATHEMATICS)

ESTABLISHMENT OF A NEW FUNCTIONAL TRANSFORM IN ANALYSIS - THE MAXIMUM TRANSFORM.
AD-293 244 DIV. 15

*OPERATORS (MATHEMATICS)
MATRIX ALGEBRA

MATRICES OF LINEAR OPERATORS; HAMILTON-CAYLEY THEOREM EXTENDED TO MATRICES OF OPERATORS ON A BANACH SPACE B.
AD-292 918 DIV. 15

*OPTICAL FILTERS
PREPARATION

A PROCEDURE FOR PRODUCING GRADIENT DENSITY LENSES PROVIDING PROTECTION FROM ABNORMAL VISUAL STIMULI. TITANIUM AND THEN SILICON MONOXIDE ARE DEPOSITED FOLLOWING EVAPORATION FROM A TUNGSTEN SPIRAL FILAMENT UNDER VACUUM.
AD-292 974 DIV. 29

*OPTICAL INDUSTRY

PERCEPTION OF DISTORTION. I. AN EXPERIMENTAL APPROACH TO ILLUSION.
AD-292 120 DIV. 28

*OPTICAL TRACKING

ACQUISITION AND TRACKING LIMITATIONS FOR TWO HYPOTHETICAL OPTICAL SPACE COMMUNICATION LINKS/ ONE BETWEEN AN EARTH SATELLITE AND A MOON SATELLITE AND ANOTHER BETWEEN AN EARTH SATELLITE AND A SPACE VEHICLE. TYPICAL ACQUISITION AND TRACKING SUBSYSTEMS.
AD-293 452 DIV. 5

*OPTICAL TRACKING
MOON

A ONE METRE MIRROR FOR MOON TRACKING AND PHOTOGRAPHY.
AD-292 741 DIV. 2

*OPTICS

A LASER AS A LIGHT SOURCE FOR PHOTOGRAPHIC

LIGHT SCATTERING FROM POLYMER FILMS. A POLARIZED SCATTERING PATTERN FROM A MIL THICK MEDIUM DENSITY POLYETHYLENE FILM OBTAINED WITH A SINGLE FLASH OF A LASER OF ABOUT 500 MICRON SEC DURATION IS COMPARED WITH A SIMILAR PICTURE REQUIRING A 4.5 HR EXPOSURE WITH CONVENTIONAL APPARATUS.
AD-293 290 DIV. 8

*ORBITAL FLIGHT PATHS
DETERMINATION

ORBIT DETERMINATION AND MAINTENANCE.
AD-292 245 DIV. 12

*ORES

METHOD AND EQUIPMENT FOR CONCENTRATING ORE AND OTHER MATERIALS.
AD-292 212 DIV. 17

*ORGANIC COATINGS

RESISTANCE OF VARIOUS ORGANIC MATERIALS TO SKYDROL 500 HYDRAULIC FLUID IMMERSION.
AD-292 285 DIV. 14

*ORGANIC COMPOUNDS
MASS SPECTROSCOPY

ANALYTICAL METHODS FOR DETERMINING MOLECULAR STRUCTURE, CHARACTERIZATION OF ORGANIC COMPOUNDS: MASS SPECTROMETRY: VIBRATIONAL SPECTROSCOPY: THERMAL ANALYSIS: POLYMERS: SYNTHESIS OF ALDEHYDES-METHYLVALERALDEHYDE, METHYL HEPTANAL.
AD-292 249 DIV. 4

*ORGANIC COMPOUNDS
RADIATION EFFECTS

RADIATION CHEMISTRY OF PETROLEUM HYDROCARBONS: NUCLEAR RADIATION IN THE PETROLEUM-REFINING INDUSTRY: PETROCHEMICAL SYNTHESIS: RADIOLYSIS OF ALKANES: RADIATION AND THERMAL STABILITY OF AROMATIC HYDROCARBONS.
AD-292 406 DIV. 20

*OSCILLATION

PROOF, THAT THE MINIMUM DISTANCE OF N NON-NEGATIVE NUMBERS OCCURS IF THEY ARE IN A CERTAIN SYMMETRY, IS USED TO OBTAIN MINIMAL OR MAXIMAL FUNDAMENTAL FREQUENCY OF A VIBRATING STRING LOADED WITH DISCRETE WEIGHTS.
AD-292 914 DIV. 15

*OXIDATION
OXIDATION INHIBITORS

EFFECT OF VARYING TEMPERATURE, PARTIAL PRESSURE OF OXYGEN, AND ALLOY COMPOSITION ON SELECTIVE OXIDATION OF MOLYBDENUM-HAFNIUM ALLOYS IN AN ATMOSPHERE OF HYDROGEN AT 1200 AND 1300 C, USING ALLOYS WITH 1.0, 5.6, 15.0, AND 29.0 ATOM PERCENT HAFNIUM.
AD-293 158 DIV. 17

*OXIDES

HIGH-TEMPERATURE VAPOR DEPOSITION GROWTH OF SINGLE CRYSTALS OF SN (IV) AND CO OXIDES.
AD-292 114 DIV. 25

PHASE COMPOSITION OF OXIDES OF 48 BASE ALLOYS: TI, V, CR, MO, W, ZR OXIDES: OXIDATION: CRYSTAL STRUCTURE.
AD-292 211 DIV. 17

DETONABILITY OF N2O AT TEMPERATURES FROM 23 TO 210 C AND PRESSURES FROM 21.4 TO 207.1 ATM IN A HIGH PRESSURE DETONATION TUBE.
AD-292 310 DIV. 22

*OXIDES
ELECTRICAL PROPERTIES

REFRACTORY OXIDES: MECHANISTIC UNDERSTANDING OF ELECTRICAL PROPERTIES OF VARIOUS METAL OXIDES. STUDIES ARE BEING MADE OF PURE ZIRCONIA AND ZIRCONIA STABILIZED WITH CALCIA: INFLUENCE OF CATION-CATION INTERACTION ON CONDUCTIVITY IN CHROMIA-ALUMINA SOLID SOLUTIONS.
AD-293 487 DIV. 14

REFRACTORY OXIDES. MEASUREMENT OF ELECTRICAL CONDUCTIVITY, THERMOELECTRIC POWER, TRANSFERENCE NUMBERS AS A FUNCTION OF TEMPERATURE AND OXYGEN PARTIAL PRESSURE.
AD-293 488 DIV. 14

*OXIDES
LOW PRESSURE RESEARCH

EFFECTS OF VACUUM, AS FOUND IN SPACE, ON PLASTICS, METALS, ELASTOMERS, OXIDES, AND LUBRICANTS. VACUUM TERMINOLOGY, PHYSICAL CONSTANTS AND CONCEPTS OF SPACE VACUUM.
AD-292 920 DIV. 14

*OXYGEN
ADSORPTION

ADSORPTION OF OXYGEN BY CRYSTAL SURFACES OF GALLIUM ANTIMONIDE.
AD-293 365 DIV. 4

*OXYGEN
ANTIMONIDES

ADSORPTION OF OXYGEN BY CRYSTAL SURFACES OF GALLIUM ANTIMONIDE.
AD-293 365 DIV. 4

*OXYGEN ELECTRODES

FUEL CELL ELECTRODE MATERIALS. RAW MATERIAL SELECTION INFLUENCES POLARIZATION BUT IS NOT A SINGLE CONTROLLING FACTOR. AVAILABLE DATA INDICATES THAT AN INTERRELATIONSHIP OF POROSITY, AVERAGE PORE VOLUME, AND PERMEABILITY CONTRIBUTES TO ELECTRODE FUEL CELL BEHAVIOR.
AD-293 490 DIV. 7

*PACKAGED CIRCUITS

DEVELOPMENT OF COMPLIANT BRIDGING TECHNIQUES, SUBSTRATE FABRICATION AND INTERCONNECTION DEPOSITION FOR MICROMINIATURIZED CIRCUITS.
AD-293 146 DIV. 8

*PACKAGING
FEEDING

THE DEVELOPMENT OF BITE SIZE FOOD PIECES AND ENCAPSULATION PROCESS.
AD-292 444 DIV. 29

*PAINT PRIMERS

RESISTANCE OF VARIOUS ORGANIC MATERIALS TO SKYDROL 500 HYDRAULIC FLUID IMMERSION.
AD-292 285 DIV. 14

*PAINTS

ACRYLIC PAINT SYSTEM - DRYING CHARACTERISTICS, CORROSION INHIBITION, COLOR STABILITY, WEATHER RESISTANCE, LUBRICANT RESISTANCE.
AD-292 276 DIV. 14

TOTAL REFLECTANCE SPECTRUM FOR WEATHERED F-106 ENAMEL PAINT ON ALUMINUM ALLOY PANELS.
AD-292 270 DIV. 14

RESISTANCE OF VARIOUS ORGANIC MATERIALS TO SKYDROL 500 HYDRAULIC FLUID IMMERSION.
AD-292 285 DIV. 14

*PAIR PRODUCTION
THEORY

REFORMULATION OF THE THEORY OF PAIRING CORRELATIONS.
AD-291 954 DIV. 15

*PANORAMIC SCANNERS

ANTENNA RESONANT FREQUENCY STUDY. EXPERIMENTALLY DETERMINING THE MECHANICAL DYNAMIC CHARACTERISTICS.
AD-293 142 DIV. 8

*PAPER CAPACITORS

CALCULATION OF THE IONIZING INTENSITY OF THE ELECTRICAL FIELD OF A LAMINATED DIELECTRIC MADE OF CAPACITOR PAPER.
AD-292 190 DIV. 7

*PARABOLIC ANTENNAS

ANTENNA RESONANT FREQUENCY STUDY. EXPERIMENTALLY DETERMINING THE MECHANICAL DYNAMIC CHARACTERISTICS.
AD-293 142 DIV. 8

*PARAMAGNETIC SALTS

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS, MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES. DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE PARAMAGNETIC SALTS, POSSIBILITY OF OBSERVING THE MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON COMPLEXES IN CDS AND CDSE.
AD-292 324 DIV. 25

*PARAMETRIC AMPLIFIERS
SOLID STATE PHYSICS

FIXED TUNED BROADBAND, 4000 TO 6000 MC, LOW NOISE PARAMETRIC AMPLIFIER, AND AN ELECTRONICALLY TUNABLE AMPLIFIER FROM 4000 TO 6000 MC.
AD-293 478 DIV. 8

*PARASITES
ALASKA

THE INCIDENCE AND DISTRIBUTION OF VARIOUS ACTUAL AND POTENTIAL INVERTEBRATE DISEASE VECTORS IN ALASKA.
AD-293 190 DIV. 16

*PARTIAL DIFFERENTIAL EQUATIONS

AN INVESTIGATION OF THE APPLICATION OF NON-LINEAR MODELING WITH FUNCTIONS OF A SPECIAL TYPE
AD-292 106 DIV. 15

THE THEORY OF NEWTONIAN GRAVITATION: TENSORS OF HIGHER RANK, THE SUPER-POTENTIALS OF HOMOGENEOUS ELLIPSOIDS AND THE POINT OF BIFURCATION ALONG THE SEQUENCE OF THE JACOBI ELLIPSOIDS ARE STUDIED.
AD-292 284 DIV. 2

SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS OF APPLIED MATHEMATICS ON AUTOMATIC DIGITAL COMPUTERS THROUGH APPROXIMATIONS BY DIFFERENCE EQUATIONS.
AD-292 752 DIV. 15

COMPOSITION FORMULAS IN GENERALIZED AXIALLY SYMMETRIC POTENTIAL THEORY.
AD-292 977 DIV. 9

ANALYTIC CONTINUATION OF 4TH ORDER ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS IN TWO INDEPENDENT REAL VARIABLES ACROSS THE X-AXIS.
AD-293 211 DIV. 15

ANALYTIC CONTINUATION OF 4TH ORDER ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT REAL VARIABLES ACROSS AN ANALYTIC BOUNDARY (Y EQUALS HY).
AD-293 212 DIV. 15

FINITE ASYMPTOTIC EXPANSIONS OF SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS (ELLIPTIC SECOND ORDER IN TWO VARIABLES).
AD-293 215 DIV. 15

*PARTIAL DIFFERENTIAL EQUATIONS
NUMERICAL ANALYSIS

STUDIES DEALING WITH THE PHYSICAL PROCESSES INVOLVED IN THE EXCHANGE OF ENERGY BETWEEN THE ATMOSPHERE AND THE EARTH'S SURFACE.
AD-293 450 DIV. 2

*PARTICLES

HEAVY PARTICLE INTERACTIONS.
AD-292 076 DIV. 20

STRONG INTERACTION SYMMETRIES AND RELATIONS OF HYPERONS BETWEEN POLARIZATIONS ARE STUDIED.
AD-293 163 DIV. 9

*PASTEURELLA

A BIBLIOGRAPHY ON PLAGUE AND PASTEURELLA PESTIS.
AD-293 214 DIV. 16

*PEARLITE

DEPENDENCE OF MECHANICAL PROPERTIES OF EUTECTOID STEEL ON THE STRUCTURAL STATE OF PEARLITE: MICROSTRUCTURE: HARDNESS: TENSILE STRENGTH: GRAIN GROWTH.
AD-292 603 DIV. 17

*PERCEPTION
DISTORTION

PERCEPTION OF DISTORTION, I. AN EXPERIMENTAL APPROACH TO ILLUSION.
AD-292 120 DIV. 28

*PERIODICALS

BULLETIN OF EXPERIMENTAL MEDICINE AND BIOLOGY (USSR) DISTURBANCE IN THE REACTIONS OF THE HEMATOPOIETIC SYSTEM AT LATE POSTIRRADIATION PERIODS, THE EFFECT OF OXYGEN DEFICIENCY AND PROLONGED RADIAL ACCELERATION ON ANIMALS.
AD-292 232 DIV. 16

*PERSONALITY

SUMMARY OF TRENDS IN ADULT PERSONALITY DEVELOPMENT, INCLUDING 33 ABSTRACTS OF STUDIES AND A BIBLIOGRAPHY.
AD-292 331 DIV. 28

*PERSPIRATION
CHEMICAL EQUILIBRIUM

CONSIDERABLE NITROGEN AND AMINO ACIDS ARE EXCRETED UNDER CONDITIONS CAUSING PROFUSE SWEATING. THESE NITROGEN LOSSES HAVE BEEN IGNORED IN POST STUDIES OR BALANCE.
AD-292 967 DIV. 16

*PERTURBATION THEORY

THE THEORY OF NEWTONIAN GRAVITATION: TENSORS OF HIGHER RANK, THE SUPER-POTENTIALS OF HOMOGENEOUS ELLIPSOIDS AND THE POINT OF BIFURCATION ALONG THE SEQUENCE OF THE JACOBI ELLIPSOIDS ARE STUDIED.
AD-292 284 DIV. 2

A DISCUSSION OF THE DUFFING PROBLEM.
AD-292 638 DIV. 15

*PETROLEUM

H GENERATION FROM LIGHT PETROLEUM DISTILLATE FOR GENERATING ELECTRICITY H2-02 FUEL CELL SUBMARINE SERVICE: EQUIPMENT AND PROCESS DESIGN.
AD-292 252 DIV. 7

RADIATION CHEMISTRY OF PETROLEUM HYDROCARBONS: NUCLEAR RADIATION IN THE PETROLEUM-REFINING INDUSTRY: PETROCHEMICAL SYNTHESIS: RADIOLYSIS OF ALKANES: RADIATION AND THERMAL STABILITY OF AROMATIC HYDROCARBONS.
AD-292 606 DIV. 20

*PETROLOGY

SOME PHYSICAL AND CHEMICAL MEASUREMENTS ON ICE WITH REFERENCE TO THE HARD HUNT CORES: OXYGEN ANALYSIS: GAS PRESSURE, STRENGTH, AND TRITIUM DIFFUSION.
AD-292 080 DIV. 2

*PHASE STUDIES

PHASE COMPOSITION OF OXIDES OF NB BASE ALLOYS: TI, V, CR, MO, W, ZR OXIDES: OXIDATION: CRYSTAL STRUCTURE.
AD-292 211 DIV. 17

EFFECTIVENESS OF SHEARING STRESSES IN ACCELERATING SOLID PHASE REACTIONS AT LOW TEMPERATURES AND HIGH PRESSURES: P-T DIAGRAM: TRANSITION KINETICS.
AD-292 300 DIV. 25

*PHOSPHORS

EFFECT IR RADIATION ON LUMINESCENCE PURE AND MIXED ASCL OR AGBR PHOSPHORS.
AD-292 665 DIV. 25

*PHOSPHORYLASES
DRUGS

THE EFFECT OF DRUGS ON CATECHOLAMINE CONTENT OF THE HEART AND ON THE PHOSPHORYLASE ACTIVITY OF THE HEART, LIVER, AND MUSCLE. THE EFFECT OF VARYING THE AMOUNTS OF DPN, AMP, ETC., ON CARBOHYDRATE METABOLISM IN CELL-FREE HEART HOMOGENATES.
AD-293 614 DIV. 16

*PHOTOELECTRIC CELLS

REFINEMENTS IN PHOTOELECTRIC PLETHYSMOGRAPHY: PART II. UTILIZATION OF PHOTOCONDUCTIVE DEVICES SHOULD BE LIMITED TO RECORDINGS OF VOLUME PULSES IF SUBJECT TO RAPID TEMPERATURE CHANGES. PHOTOTUBES ARE MORE SUITABLE FOR CLIMATE CHAMBER STUDIES WHEN CHANGES IN BLOOD CONTENT OF TISSUE ARE DESIRED.
AD-293 136 DIV. 16

*PHOTOGRAPHIC ANALYSIS

PHOTOGRAPHIC OBSERVATIONS OF INSTABILITIES IN A PLASMA INJECTED INTO A NON-VARYING AXIAL MAGNETIC FIELD.
AD-292 930 DIV. 25

*PHOTOGRAPHIC EMULSIONS

PROBLEMS OF PHOTOGRAPHIC SPECTROPHOTOMETRY OF SHORT DURATION LIGHT PULSES: GRANULARITY, RECIPROCITY FAILURE, AND LATENT IMAGE STABILITY.
AD-292 164 DIV. 24

*PHOTOGRAPHIC EQUIPMENT

EMPLOYMENT AND SUITABILITY TEST OF 70MM FILM PROCESSING EQUIPMENT.
AD-293 618 DIV. 24

*PHOTOGRAPHIC FILM

PROBLEMS OF PHOTOGRAPHIC SPECTROPHOTOMETRY OF SHORT DURATION LIGHT PULSES: GRANULARITY, RECIPROCITY FAILURE, AND LATENT IMAGE STABILITY.
AD-292 164 DIV. 24

*PHOTOGRAPHIC FILM
OPTICS

A LASER AS A LIGHT SOURCE FOR PHOTOGRAPHIC LIGHT SCATTERING FROM POLYMER FILMS. A POLARIZED SCATTERING PATTERN FROM A MIL THICK MEDIUM DENSITY POLYETHYLENE FILM OBTAINED WITH A SINGLE FLASH OF A LASER OF ABOUT 500 MICRON SEC DURATION IS COMPARED WITH A SIMILAR PICTURE REQUIRING A 4.5 HR EXPOSURE WITH CONVENTIONAL APPARATUS.
AD-293 290 DIV. 8

*PHOTOGRAPHY
MOON

A ONE METRE MIRROR FOR MOON TRACKING AND PHOTOGRAPHY.
AD-292 741 DIV. 2

*PHOTOMULTIPLIERS

A PHOTOMULTIPLIER READOUT FOR THE BAUSCH AND LOMB 1.5 METER STIGMATIC SPECTROGRAPH.
AD-292 984 DIV. 24

*PHOTOTUBES

REFINEMENTS IN PHOTOELECTRIC PLETHYSMOGRAPHY: PART II. UTILIZATION OF PHOTOCONDUCTIVE DEVICES SHOULD BE LIMITED TO RECORDINGS OF VOLUME PULSES IF SUBJECT TO RAPID TEMPERATURE CHANGES. PHOTOTUBES ARE MORE SUITABLE FOR CLIMATE CHAMBER STUDIES WHEN CHANGES IN BLOOD CONTENT OF TISSUE ARE DESIRED.
AD-293 136 DIV. 16

CONVERGENT GUN MICROWAVE PHOTOTUBES.
AD-293 140 DIV. 8

*PHYSICAL PROPERTIES

PHYSICAL PROPERTIES OF THE UPPER ATMOSPHERE.
AD-293 673 DIV. 2

*PHYSIOLOGY
ELECTRICAL PROPERTIES

A REPORT FROM AN ALL-UNION (USSR) SYMPOSIUM DEALING WITH THE USE OF CYBERNETICS IN MEDICINE, BIOLOGY, AND PHYSIOLOGY. THE BIOELECTROSTIMULATOR WAS USED AS A NEW METHOD OF DIAGNOSIS AND STIMULATION OF THE NEUROMUSCULAR APPARATUS OF A HUMAN BEING THROUGH THE USE OF AMPLIFIED BIOPOTENTIAL OSCILLATIONS.
AD-292 810 DIV. 16

*PIEZOELECTRIC CRYSTALS

COUPLED MODE THEORY OF ACOUSTIC WAVE AMPLIFIERS.
AD-292 320 DIV. 8

*PIEZOELECTRIC TRANSDUCERS

CONTINUING RESEARCH ON PIEZOELECTRIC CERAMIC TRANSDUCER TESTED IN SOUND FIELDS UP TO 140 DB.
AD-292 314 DIV. 8

*PITUITARY HORMONES

CLARIFICATION OF THE HYPOTHALAMO-ANTERIOR HYPOPHYSICAL INTERRELATIONSHIP WITH EFFORTS CONCENTRATED ON REGULATION OF ACTH SECRETION AND REGULATION OF THE SECRETION OF GONADOTROPHINS.
AD-293 158 DIV. 16

*PLANETS

REVIEW OF BOOK 'PLANETS AND SATELLITES'.
AD-292 168 DIV. 32

*PLANTS
ALASKA

ALASKAN WILD PLANTS AS AN EMERGENCY FOOD SOURCE. DETERMINATION OF NUTRITIONAL VALUES AND POISONOUS AND EDIBLE VARIETIES.
AD-293 131 DIV. 29

*PLANTS
ECOLOGY

STUDY OF WILD EDIBLE PLANTS IN ALASKA TO DETERMINE THE POTENTIAL VALUE TO AIRCREW SURVIVORS. THE RECORDS OF THE OCCURRENCE OF EDIBLE AND POISONOUS SPECIES SHOULD NOT BE TAKEN AS IMPLYING USABLE QUANTITIES NOR AVAILABILITY AT ALL SEASONS.
AD-293 172 DIV. 16

*PLASMA JETS
ELECTRIC ARCS

PROPERTIES OF PLASMAS AS RELATED TO THERMAL ARC-JETS AND SELECTION OF PROPELLANTS OF AN ELECTRO-THERMAL ENGINE IN CONSIDERATION OF ENGINE PERFORMANCE AND LIFE.
AD-292 001 DIV. 25

*PLASMA OSCILLATIONS

NONLINEAR EFFECTS IN A MAGNETOACTIVE PLASMA: FREQUENCY DEPENDENCE OF CROSS MODULATION (LUXEMBURG-GORKOV'SKIY EFFECT): RESONANCE OF CROSS MODULATION AT GYROFREQUENCY.
AD-292 235 DIV. 25

NON-LINEAR PLASMA WAVES IN A STREAMING HOMOGENEOUS, COLD IONIZED MEDIUM.
AD-292 687 DIV. 25

*PLASMA PHYSICS

DIFFRACTION BY A PERFECTLY CONDUCTING SEMI-INFINITE SCREEN IN AN ANISOTROPIC PLASMA.
AD-291 918 DIV. 25

PROPERTIES OF PLASMAS AS RELATED TO THERMAL ARC-JETS AND SELECTION OF PROPELLANTS OF AN ELECTRO-THERMAL ENGINE IN CONSIDERATION OF ENGINE PERFORMANCE AND LIFE.
AD-292 001 DIV. 25

THE CONDITIONS OF EQUILIBRIUM AND STABILITY OF A CHARGED, SPATIALLY RESTRICTED PLASMA
AD-292 188 DIV. 25

DISTRIBUTION OF IONS IN THE PLASMA OF AN ARC DISCHARGE: DEPENDENCE OF DEGREE OF IONIZATION ON VAPORIZATION FROM THE ANODE OR CATHODE.
AD-292 209 DIV. 25

NONLINEAR EFFECTS IN A MAGNETOACTIVE PLASMA: FREQUENCY DEPENDENCE OF CROSS MODULATION (LUXEMBURG-GORKOV'SKIY EFFECT): RESONANCE OF CROSS MODULATION AT GYROFREQUENCY.
AD-292 235 DIV. 25

SHOCK TUBE SPECTROSCOPY IN THE UV REGION: IO2 BAND SYSTEM: BAND HEADS OF TINI BA ABSORPTION SPECTRUM.
AD-292 286 DIV. 25

HIGH-POWER GAS DISCHARGE LAMPS.
AD-292 610 DIV. 25

OPTICAL INTERFEROMETRY FOR PLASMA DIAGNOSTICS.
AD-292 626 DIV. 20

NON-LINEAR PLASMA WAVES IN A STREAMING HOMOGENEOUS, COLD IONIZED MEDIUM.
AD-292 687 DIV. 25

A STUDY OF THE INTERACTION BETWEEN ELECTROMAGNETIC FIELDS AND PLASMAS IS PRESENTED.
AD-292 714 DIV. 25

OBSERVATIONS OF COLLECTIVE PHENOMENA IN PLASMA ARE STUDIED.
AD-292 707 DIV. 25

PHOTOGRAPHIC OBSERVATIONS OF INSTABILITIES IN A PLASMA INJECTED INTO A NON-VARYING AXIAL MAGNETIC FIELD.
AD-292 930 DIV. 25

BIBLIOGRAPHY OF RUSSIAN LITERATURE IN THE FIELD OF MAGNETOHYDRODYNAMICS, 1959 TO 1962. MAIN SOURCES INCLUDED INTERNATIONAL AEROSPACE ABSTRACTS, MONTHLY INDEX TO RUSSIAN ACCESSIONS, ENGINEERING INDEX, TECHNICAL TRANSLATIONS, NASA ANNOUNCEMENTS, AND MONTHLY CATALOGUE OF U.S. GOVERNMENT PUBLICATIONS.
AD-293 273 DIV. 9

DEVELOPS THEORY OF TRANSPORT PHENOMENA AS APPLIED TO THERMOCOUPLES, USING THE BOLTZMANN TRANSPORT EQUATION.
AD-293 411 DIV. 25

*PLASMA PHYSICS
POWER PLANTS

ION PRODUCTION AND FLOW IN AN ELECTROHYDRODYNAMIC GENERATOR.
AD-292 334 DIV. 20

*PLASMA SUBSTITUTES
ANEMIA

IN DOGS WITH VENTRICULAR FIBRILLATION, VARIOUS COMBINATIONS OF EXTERNAL CARDIAC COMPRESSIONS AND LUNG INFLATIONS, EPINEPHRINE AND NOR EPINEPHRINE, AND PLASMA EXPANDERS WERE STUDIED. EFFECTS ON ARTERIAL PRESSURE, BLOOD FLOW, O2 AND CO2 SATURATION, AND PH VALUES, E.E.G. AND EKG WERE MEASURED. CLINICAL TESTS WERE ALSO REPORTED.
AD-293 415 DIV. 16

*PLASTIC COATINGS

CONFORMAL COATINGS FOR PRINTED CIRCUIT ASSEMBLIES: EPOXY-, ACRYLIC-, AND POLYSTYRENE COATING SYSTEMS: PHYSICAL AND ELECTRICAL PROPERTIES: ADHESION AND HUMIDITY EFFECTS.
AD-293 234 DIV. 14

*PLASTICITY

PLASTIC PROPERTIES RESEARCH. INFLUENCE OF GRAIN BOUNDARY RELAXATION ON ELASTICITY OF POLYCRYSTALLINE AGGREGATES: MODULUS COMPENSATED ACTIVATION ENERGY FOR CREEP: ELASTIC AND PLASTIC PROPERTIES OF PURE POLYCRYSTALLINE COPPER: EFFECT OF FERROMAGNETISM ON ELASTIC AND PLASTIC PROPERTIES OF FE, CO AND NI.
AD-292 798 DIV. 17

*PLASTICS
DEFORMATION

DEFORMATION MECHANISMS IN BRANCHED POLYETHYLENE MELTS. EXPERIMENTED DETERMINATION OF POINT TO POINT RESPONSE OF THE MELTS TO STRESS.
AD-293 409 DIV. 14

***PLASTICS**
IMPACT SHOCK

IMPACT SHOCK IN PLASTICS BY ULTRA-SHORT IMPULSE LOADING.
AD-292 122 DIV. 14

***PLASTICS**
LOW PRESSURE RESEARCH

EFFECTS OF VACUUM, AS FOUND IN SPACE, ON PLASTICS, METALS, ELASTOMERS, OXIDES, AND LUBRICANTS. VACUUM TERMINOLOGY, PHYSICAL CONSTANTS AND CONCEPTS OF SPACE VACUUM.
AD-292 920 DIV. 14

***PLOTTERS**

TESTS OF BASIC GEOMETRICAL QUALITIES OF PHOTOGRAMMETRIC PLOTTING INSTRUMENT.
AD-292 971 DIV. 2

***POLARIZATION**

STRONG INTERACTION SYMMETRIES AND RELATIONS OF HYPERONS BETWEEN POLARIZATIONS ARE STUDIED.
AD-293 163 DIV. 9

***POLARIZATION**
CHEMICAL BONDS

THE INTERNAL FIELD AND THE ADDITIVITY OF BOND POLARIZABILITIES.
AD-293 436 DIV. 6

***POLYMERIZATION**

POLYMER CHEMISTRY. A BRIEF AND GENERAL SURVEY OF THE CHEMISTRY AND PHYSICAL CHEMISTRY OF HIGH POLYMERS IS PRESENTED, WITH CHIEF EMPHASIS ON LINEAR POLYMERS.
AD-292 931 DIV. 6

***POLYMERS**
CHEMISTRY

POLYMER CHEMISTRY. A BRIEF AND GENERAL SURVEY OF THE CHEMISTRY AND PHYSICAL CHEMISTRY OF HIGH POLYMERS IS PRESENTED, WITH CHIEF EMPHASIS ON LINEAR POLYMERS.
AD-292 931 DIV. 6

***POLYMERS**
CRYSTALLIZATION

CRYSTALLINITY OF POLYOLEFINS. X-RAY DETERMINATION USING COMPARISON OF CRYSTALLINE AND AMORPHOUS PEAKS.
AD-293 291 DIV. 25

***POLYMERS**
FILMS

A LASER AS A LIGHT SOURCE FOR PHOTOGRAPHIC LIGHT SCATTERING FROM POLYMER FILMS. A POLARIZED SCATTERING PATTERN FROM A MIL THICK MEDIUM DENSITY POLYETHYLENE FILM OBTAINED WITH A SINGLE FLASH OF A LASER OF ABOUT 500 MICRON SEC DURATION IS COMPARED WITH A SIMILAR PICTURE REQUIRING A 0.5 HR EXPOSURE WITH CONVENTIONAL APPARATUS.
AD-293 290 DIV. 6

***POLYMERS**
IMPACT SHOCK

MEASUREMENT OF COUPLING BETWEEN A STEEL SPHERE AND METAL OR PLASTIC RODS AS THE SPHERE IMPACTS THE ROD ENDS.
AD-293 280 DIV. 25

***POLYMERS**
MELTING

DEFORMATION MECHANISMS IN BRANCHED POLYETHYLENE MELTS. EXPERIMENTED DETERMINATION OF POINT TO POINT RESPONSE OF THE MELTS TO STRESS.
AD-293 405 DIV. 14

***POLYMERS**
SYNTHESIS

ANALYTICAL METHODS FOR DETERMINING MOLECULAR STRUCTURE, CHARACTERIZATION OF ORGANIC COMPOUNDS; MASS SPECTROMETRY; VIBRATIONAL SPECTROSCOPY; THERMAL ANALYSIS; POLYMERS; SYNTHESIS OF ALDEHYDES-METHYLVALERALDEHYDE, METHYL HEPTANAL.
AD-292 349 DIV. 6

***POLYNOMIALS**

AN INVESTIGATION OF THE APPLICATION OF NON-LINEAR MODELING WITH FUNCTIONS OF A SPECIAL TYPE
AD-292 106 DIV. 15

PROPERTIES OF SOME ALL-POLE TRANSFER FUNCTION OF FILTERS.
AD-293 153 DIV. 8

DERIVATION OF AN INTEGRAL INVERSION FORMULA FOR AN INTEGRAL TRANSFORMATION WHICH CONTAINS THE GEGENBAUER POLYNOMIAL IN THE KERNEL.
AD-293 456 DIV. 15

***POSITION FINDING**
RADAR ANALYSIS

CARTESIAN VELOCITY AND ACCELERATION FROM RANGE-ONLY DATA.
AD-292 116 DIV. 6

***POTASSIUM**

INSTRUMENTATION FOR MEASUREMENT OF VAPOR PRESSURE OF ALKALI METALS (CS, K, NA, LI) FROM 10 TO THE -5TH POWER TO 10 TO THE -2ND POWER MM HG.
AD-292 216 DIV. 4

***POWDER METALS**

PREPARATION OF FINE B POWDER BY REDUCTION WITH ZN, BY ELECTROLYSIS, AND CYANIDE-REDUCTION.
AD-292 029 DIV. 17

RELATION OF MECHANICAL, TEXTURAL, AND THERMAL EXPANSION PROPERTIES TO STRUCTURE IN SINTERED ALUMINUM POWDER FROM 550 TO 600 C.
AD-292 061 DIV. 17

***POWER SUPPLIES**

DEVELOPMENT OF A SYNCHRONOUS MAGNETOGASDYNAMIC A-C GENERATOR.
AD-292 220 DIV. 7

***POWER SUPPLIES**
LOW TEMPERATURE BATTERIES

LOW TEMPERATURE PA-2270/U-XLT-1 BATTERIES; IN-PLANT AND SIGNAL CORPS TESTING OF 500 BATTERIES; DISCHARGE AND ELECTROLYTE LEAKAGE TESTS; PERFORMANCE UP TO AND INCLUDING 24 MONTHS DELAY.
AD-293 425 DIV. 7

***POWER SUPPLIES**
SUBMARINES

DESIGN STUDY FOR HYDROGEN GENERATION PLANT FOR SUBMARINE FUEL CELLS BASED ON AMMONIA DECOMPOSITION.
AD-292 139 DIV. 7

***POWER SUPPLIES**
THEORY

THEORY OF A MAGNETOGASDYNAMIC GENERATOR.
AD-292 226 DIV. 7

***POWER SUPPLIES**
THERMIONIC EMISSION

FEASIBILITY OF A NUCLEAR SPACE POWER SYSTEM THAT UTILIZES A THERMIONIC RADIATION; AN ELECTRICALLY HEATED REFRACTORY METAL (CB-ZR) TEST LOOP; REFRACTORY METAL PROPERTIES; LIQUID LITHIUM.
AD-293 453 DIV. 7

***PRECIPITATION**
RADAR

APPLICATION OF RADAR DATA TO FORECASTING OF TERMINAL WEATHER CONDITIONS.
AD-293 421 DIV. 2

***PRECIPITATION**
RADAR REFLECTIONS

UTILITY OF RADAR EQUIPMENT IN MEASURING SURFACE PRECIPITATION; CORRELATION BETWEEN RADAR VARIABLE AND ACTUAL RAINFALL QUANTITIES BY MEANS OF RAINDROP-SIZE DISTRIBUTION.
AD-293 230 DIV. 2

***PRECISION FINISHING**

EFFECT OF THERMAL DEFORMATIONS OF MACHINE UNITS OF PRECISION GRINDING ON MACHINING ACCURACY; DEFORMATION; FRICTION; LATHE MACHINES.
AD-292 219 DIV. 26

***PRESERVATION**
WOOD

MARINE MICROORGANISMS WERE SHOWN TO METABOLIZE NAPHTHALENE AND PHENANTHRENE IN CREOSOTED PILING, REDUCING THE TOXICITY TO MARINE BORERS.
AD-291 905 DIV. 16

***PRESSURE**

ARTICLES ON COMBUSTION AT LOWERED PRESSURE AND PROBLEMS IN STABILIZATION OF A FLAME IN SINGLE-PHASE AND DOUBLE-PHASE SYSTEMS.
AD-292 190 DIV. 10

***PRINTED CIRCUITS**
ELECTRIC CABLES

PRINTED CABLES AND CONNECTORS.
AD-293 629 DIV. 8

***PROBABILITY**

LIMITING DISTRIBUTION OF A MARKOV PROCESS WITH STATIONARY TRANSITION PROBABILITIES IS ALSO THE STATIONARY DISTRIBUTION IF THE PROCESS DECAYS EXPONENTIALLY BUT IS INCREMENTED AT POISSON TIMES BY RANDOM AMOUNTS.
AD-292 063 DIV. 15

DESCRIPTION AND COMPARISON OF COMPUTER METHODS OF CIRCUIT ANALYSIS.
AD-292 321 DIV. 8

CALCULATIONS WITH PSEUDO-RANDOM NUMBERS.
AD-292 608 DIV. 15

THE CIRCULAR COVERAGE FUNCTION, AN ASPECT OF GAUSSIAN DISTRIBUTION.
AD-293 675 DIV. 15

THEORETICAL EXPLANATION OF OBSERVED DECREASING FAILURE RATE.
AD-293 692 DIV. 26

***PROBABILITY**
THEORY

THE STUDY OF CORRELATED RANDOM VALUES.
AD-292 609 DIV. 15

***PROCESSING**

CLEANING SCALE FROM ROLLED METAL BY PASSING THE METAL THROUGH A BATH WHERE IT IS SUBJECTED TO POWERFUL ELECTROHYDRAULIC SHOCKS.
AD-292 181 DIV. 26

***PRODUCTION**

XM-52 ARM-SAFE DEVICE.
AD-293 680 DIV. 22

STUDIES ON BOTTLENECK PROBLEMS IN PRODUCTION PROCESSES.
AD-293 677 DIV. 15

***PROGRAMMING**

SOME PROBLEMS OF BASIC ORGANIZATION IN PROBLEM-SOLVING PROGRAMS.
AD-292 109 DIV. 30

SYMBOLIC ADDRESS CODING BASED ON ALGOL (SOAP).
AD-292 948 DIV. 30

THE ASO EXECUTIVE ROUTINE PILOT MODEL FOR INFORMATION STORAGE AND RETRIEVAL SYSTEMS.
AD-293 106 DIV. 30

FORTRAN PROGRAM TO ESTIMATE CUMULATIVE SURVIVAL PROBABILITY AND VARIANCE.
AD-293 155 DIV. 30

A COMPUTER PROGRAM FOR DETERMINING RADAR TRACKING INFORMATION FROM MISSILE POSITION, VELOCITY AND ATTITUDE DATA.
AD-293 489 DIV. 30

STUDIES ON BOTTLENECK PROBLEMS IN PRODUCTION PROCESSES.
AD-293 679 DIV. 15

A REVIEW OF SOME APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING.
AD-293 679 DIV. 15

***PROGRAMMING**
COMPUTERS

ANATOMY OF A GENERALIZED ASSEMBLY SYSTEM.
AD-292 168 DIV. 30

***PROJECTILES**
AERODYNAMIC CONFIGURATIONS

EFFECT OF SYMMETRY ON THE LINEARIZED FORCE SYSTEM.
AD-293 631 DIV. 22

***PROPAGATION**

FRESNEL GAIN OF APERTURE ANTENNA.
AD-291 956 DIV. 8

EFFORTS TO DETECT THE LONG-DELAYED ECHOES WHICH SHOULD RESULT FROM THE MAGNETIC DUCT THEORY OF PROPAGATION.
AD-293 223 DIV. 8

INVESTIGATION OF HIGH FREQUENCY PROPAGATION IN THE IONOSPHERE USING SATELLITE TRANSMISSIONS.
AD-293 430 DIV. 8

*PROPELLANTS

AIR DISPERSION OF TOXIC ROCKET EXHAUST.
AD-293 432 DIV. 25

*PROTEINS

FEEDING LOW PROTEIN DIETS TO GROWING CHICKS RESULTS IN ELEVATED PLASMA CHOLESTEROL AND GLYCERIDE LEVELS, BUT DOES NOT ALTER THE PLASMA LIPID PHOSPHORUS LEVELS IN THE ABSENCE OF DIETARY CHOLESTEROL. DIETARY CHOLESTEROL ELEVATED ALL PLASMA LIPID COMPONENTS REGARDLESS OF DIETARY PROTEIN LEVEL; THE INCREASES WERE GREATER IN THE LOW PROTEIN FED GROUPS. THE FATTY ACID COMPOSITION OF PLASMA AND LIVER CHOLESTEROL ESTERS WAS ALTERED BY THE DIETARY TREATMENTS EMPLOYED.
AD-292 642 DIV. 16

*PROTEINS
BIOCHEMISTRY

CHEMISTRY OF ALGAL BILIPROTEINS.
AD-292 679 DIV. 16

*PROTEINS
NUTRITION

THE INTERACTION BETWEEN DIETARY PROTEIN LEVEL AND THE DAILY PERFORMANCE OF STRENUOUS WORK, WEIGHT, SKINFOLD THICKNESS, NITROGEN BALANCE, SODIUM AND POTASSIUM BALANCES, CREATININE AND URIC ACID EXCRETION, ETC., WERE MEASURED.
AD-292 347 DIV. 16

*PROTONS

HEAVY PARTICLE INTERACTIONS.
AD-292 078 DIV. 20

*PSYCHOMETRICS
TRACKING

THE EFFECTS OF AIR IONS ON HUMAN PERFORMANCE DURING PSYCHOMOTOR TASKS.
AD-293 170 DIV. 26

*PULSE AMPLIFIERS

RESTORATION OF QUENCHING AND SYNCHRONIZING PULSES IN THE VIDEO SIGNAL AFTER MAGNETIC RECORDING.
AD-292 231 DIV. 8

***Q FEVER**

BIBLIOGRAPHY ON Q-FEVER VIRUS AND HOSTS.
AD-293 213 DIV. 16

***QUADRUPOLE MOMENTS**

NUCLEAR RELAXATION OF N-14 BY QUADRUPOLE INTERACTION IN MOLECULAR LIQUIDS.
AD-293 441 DIV. 20

***QUANTUM MECHANICS**

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS. MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES. DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE PARAMAGNETIC SALTS. POSSIBILITY OF OBSERVING THE MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON COMPLEXES IN CDS AND CDSE.
AD-292 326 DIV. 25

STRONG INTERACTION SYMMETRIES AND RELATIONS OF HYPERONS BETWEEN POLARIZATIONS ARE STUDIED.
AD-293 163 DIV. 9

THE ALTERNATE MOLECULAR ORBITAL METHOD: APPLICATION TO CYCLIC SYSTEMS USING BENZENE AS AN EXAMPLE.
AD-293 240 DIV. 25

***QUARTZ CRYSTALS**

EFFORTS TO PRODUCE FILTER TYPE CRYSTALS FOR USE IN THE HIGH FREQUENCY BAND.
AD-292 910 DIV. 8

DESIGN OF 9TH OVERTONE QUARTZ CRYSTAL UNITS FROM 150 TO 200 MC.
AD-293 261 DIV. 8

***QUATERNARY AMINES**
ABSORPTION

THE PHOSPHATIDO-PEPTIDE FRACTION EXTRACTED FROM INTESTINE IS SHOWN TO MARKEDLY INCREASE THE INTESTINAL ABSORPTION OF THE QUATERNARY AMINES OXYPHENONIUM, HEXAMETHONIUM, SECFRIAN, BENZOMETHAMINE, AND TUBOCURARINE. THE DIFFERENCE IN THE RATES OF INTESTINAL ABSORPTION OF 9 SALTS OF 2-PAM WAS ALSO STUDIED IN AN ISOLATED LOOP.
AD-293 272 DIV. 16

***QUINOXALINES**

A PROPOSED EXPERIMENTAL PULSED REACTOR.
AD-291 909 DIV. 20

***RADAR**

SELECTED ARTICLES ON RADAR OBSERVATION OF METEORS AND METEORIC TRACES.
AD-292 219 DIV. 8

***RADAR ANTENNAS**

THE EL CAMPO SOLAR RADAR ANTENNA.
AD-292 179 DIV. 8

A LIGHTWEIGHT, MINIATURE SYSTEM FOR AUTOMATICALLY CONTROLLING THE RADIATION PATTERN OF BEACON ANTENNA ARRAYS MOUNTED ON MISSILES AND AIRCRAFT.
AD-292 641 DIV. 8

***RADAR BEACONS**

A LIGHTWEIGHT, MINIATURE SYSTEM FOR AUTOMATICALLY CONTROLLING THE RADIATION PATTERN OF BEACON ANTENNA ARRAYS MOUNTED ON MISSILES AND AIRCRAFT.
AD-292 641 DIV. 8

***RADAR BEACONS**
TEST EQUIPMENT

MISTRAM AUXILIARY CHECKOUT KIT TO TEST A MISSILE TRANSPONDER BEFORE LAUNCH TO VERIFY NECESSARY X-BAND MISTRAM OPERATION.
AD-293 208 DIV. 30

***RADAR ECHO AREAS**
MEASUREMENT

TECHNIQUES FOR MEASUREMENT OF LOW RADAR CROSS SECTIONS OF PHYSICALLY LARGE OBJECTS.
AD-292 955 DIV. 30

***RADAR ECHO AREAS**
RAINDROPS

UTILITY OF RADAR EQUIPMENT IN MEASURING SURFACE PRECIPITATION; CORRELATION BETWEEN RADAR VARIABLE AND ACTUAL RAINFALL QUANTITIES BY MEANS OF RAINDROP-SIZE DISTRIBUTION.
AD-293 250 DIV. 2

***RADAR EQUIPMENT**
DISPLAY SYSTEMS

RELIABILITY, MAINTAINABILITY, AND TESTS OF RADAR EQUIPMENT AND COMPONENTS.
AD-292 936 DIV. 6

***RADAR EQUIPMENT**
RADAR TRANSMITTERS

RADAR TEST SET AN/APM-123; RADAR SET TS-1314.
AD-292 048 DIV. 6

***RADAR INTERFERENCE**
REDUCTION

INTERFERENCE BLANKER AN/GPX-27 WHICH USES STORAGE TUBES TO ELIMINATE NONSYNCHRONOUS SIGNALS FROM RADAR BEACON VIDEO REPLIES.
AD-292 113 DIV. 6

***RADAR RECEIVERS**

S-BAND SOLID-STATE RECEIVERS. A DETECTOR AMPLIFIER COMPOSED OF SEMICONDUCTOR AND OTHER SOLID-STATE COMPONENTS. A TUNABLE YIG PRESELECTOR, A TRANSISTORIZED BALANCED MIXER, A BROADBAND IF AMPLIFIER.
AD-292 129 DIV. 8

***RADAR SIGNALS**
SCATTERING

MEASUREMENTS OF THE DISTRIBUTION OF ELECTRONS IN THE F-REGION OF THE IONOSPHERE BY OBSERVING THE WEAK INCOHERENT BACKSCATTER SIGNAL.
AD-292 730 DIV. 8

***RADAR TRACKING**

A LIGHTWEIGHT, MINIATURE SYSTEM FOR AUTOMATICALLY CONTROLLING THE RADIATION PATTERN OF BEACON ANTENNA ARRAYS MOUNTED ON MISSILES AND AIRCRAFT.
AD-292 641 DIV. 8

MISTRAM AUXILIARY CHECKOUT KIT TO TEST A MISSILE TRANSPONDER BEFORE LAUNCH TO VERIFY NECESSARY X-BAND MISTRAM OPERATION.
AD-293 208 DIV. 30

***RADAR TRACKING**
MATHEMATICAL COMPUTER DATA

A COMPUTER PROGRAM FOR DETERMINING RADAR TRACKING INFORMATION FROM MISSILE POSITION, VELOCITY AND ATTITUDE DATA.
AD-293 480 DIV. 30

***RADIATION DAMAGE**

AN ECONOMICAL, ARCH-SHAPED SHELTER, UTILIZING PNEUMATICALLY-PLACED MORTAR, PROVIDES PROTECTION FOR 100 MEN AND AN OVERPRESSURE OF 100 PSI.
AD-292 930 DIV. 13

***RADIATION DAMAGE**
MEASUREMENT

RADIATION RESISTANT FLIGHT CONTROL SYSTEMS
AD-292 307 DIV. 1

***RADIATION EFFECTS**

RADIATION BALANCE OF THE NORTHERN HEMISPHERE.
AD-292 217 DIV. 20

MECHANICAL PROPERTIES AND STRENGTH OF THICK-WALLED CYLINDRICAL AND HOLLOW SPHERICAL SHELLS EXPOSED TO IRRADIATION; NEUTRON BEAMS.
AD-292 218 DIV. 25

RADIATION RESISTANT FLIGHT CONTROL SYSTEMS
AD-292 307 DIV. 1

TESTS TO OBTAIN VEGETATION REFLECTANCE DATA FROM 250 TO 2000 MILIMICRONS IN ORDER TO DETERMINE THE EFFECT OF UNDERGROUND NUCLEAR EXPLOSIONS ON VEGETATION.
AD-292 994 DIV. 20

RESULTS OF A FLIGHT TO MEASURE THE RADIANT TEMPERATURE OF THE SKY AT HIGH ALTITUDE.
AD-293 195 DIV. 2

THE ROLE OF ELECTRON MICROSCOPY IN OBSERVATIONS OF RADIATION DAMAGE.
AD-293 699 DIV. 20

***RADIATION EFFECTS**
CANCER

THE INCIDENCE OF MALIGNANT LYMPHOMA IN X-IRRADIATED MICE IS REPORTED FOR GROUPS RECEIVING SINGLE AND FRACTIONATED DOSES AND FRACTIONATED DOSES WITH ONE THIGH SHIELDED.
AD-292 123 DIV. 16

***RADIATION EFFECTS**
THERAPY

THE CAPACITY OF INTRAVENOUSLY INJECTED CELLS FROM PERITONEAL FLUID, PERIPHERAL BLOOD, LYMPHNODES, THYMUS AND BONE MARROW TO RESTORE HEMATOPOIESIS IN LETHALLY X-IRRADIATED MICE.
AD-292 074 DIV. 16

***RADIATION HAZARDS**
SHIELDING

A COMPILATION OF RADIOACTIVE FALLOUT FROM A NUCLEAR REACTOR IN GREENLAND.
AD-293 660 DIV. 20

***RADIO**

RADIOELECTRONICS - APPLICATIONS TO SPACESHIPS AND SPACE FLIGHT. USSR TRANSLATION.
AD-292 237 DIV. 8

***RADIO ALTIMETERS**
FLIGHT TESTING

FLIGHT TESTING OF AN/APN-155 RADAR ALTIMETERS.
AD-291 968 DIV. 1

***RADIO COMMUNICATION SYSTEMS**

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES, INTERCONTINENTAL AREAS AND THE SUPPORT REGIONS.
AD-291 999 DIV. 5

ACTIVITY REPORT ON AIRPORT FACILITY INCLUDING TRAFFIC CONTROL, DISPLAY SYSTEMS, LIGHTING, COMMUNICATIONS, AND LANDING SYSTEMS.
AD-292 072 DIV. 1

ILLUSTRATIONS OF USER TEST MODELS OF THE AN/GRC-106 RADIO SET.
AD-293 416 DIV. 5

***RADIO EQUIPMENT**

FEASIBILITY OF PROVIDING FIELD INSTRUMENTATION CAPABLE OF SHOWING THE RATE OF DEGRADATION OF PERFORMANCE OF AN INDIVIDUAL ELECTRONIC EQUIPMENT EXPRESSED IN TERMS OF OPERATING TIME REMAINING UNTIL FAILURE OCCURS.
AD-292 161 DIV. 8

PREDICTED AND MEASURED RELIABILITY INDEX OF RADIO SET AN/URC-32.
AD-292 176 DIV. 5

RADIOELECTRONICS - APPLICATIONS TO SPACESHIPS AND SPACE FLIGHT. USSR TRANSLATION.
AD-292 237 DIV. 8

***RADIO INTERFERENCE**

A COMPUTER-AUGMENTED TECHNIQUE FOR THE DESIGN OF LIKELIHOOD-RATIO RECEIVERS.
AD-292 161 DIV. 8

***RADIO RECEIVERS**

S-BAND SOLID-STATE RECEIVERS. A DETECTOR AMPLIFIER COMPOSED OF SEMICONDUCTOR AND OTHER SOLID-STATE COMPONENTS. A TUNABLE YIG PRESELECTOR, A TRANSISTORIZED BALANCED MIXER, A BROADBAND IF AMPLIFIER.
AD-292 129 DIV. 8

A COMPUTER-AUGMENTED TECHNIQUE FOR THE DESIGN OF LIKELIHOOD-RATIO RECEIVERS.
AD-292 161 DIV. 8

PREDICTED AND MEASURED RELIABILITY INDEX OF RADIO SET AN/URC-32.
AD-292 176 DIV. 5

***RADIO RECEIVERS**
SIGNAL-TO-NOISE RATIO

DETECTION OF A RANDOMLY DISTORTED SIGNAL IN GAUSSIAN NOISE.
AD-291 982 DIV. 6

***RADIO SIGNALS**

AN INSTANCE OF AMPLITUDE ERROR DISCRETIZATION OF SIGNALS.
AD-292 607 DIV. 8

INVESTIGATION OF HIGH FREQUENCY PROPAGATION IN THE IONOSPHERE USING SATELLITE TRANSMISSIONS.
AD-293 430 DIV. 8

***RADIO SIGNALS**
DISTORTION

DETECTION OF A RANDOMLY DISTORTED SIGNAL IN GAUSSIAN NOISE.
AD-291 982 DIV. 6

***RADIO TRANSMITTERS**

PREDICTED AND MEASURED RELIABILITY INDEX OF RADIO SET AN/URC-32.
AD-292 176 DIV. 5

***RADIO WAVES**
SPACE PROBES

INVESTIGATION OF THE LOWER IONOSPHERE BY MEANS OF LONG RADIO WAVES AND LOW-FREQUENCY PROBES INSTALLED ON A ROCKET.
AD-292 959 DIV. 2

***RADIOACTIVE FALL-OUT**

PHODIUM-102 HIGH ALTITUDE TRACER EXPERIMENT. A NUCLEAR EXPLOSION OVER JOHNSTON ISLAND.
AD-291 927 DIV. 20

***RADIOACTIVE ISOTOPES**

TRANSFER THROUGH THE TROPOPAUSE AND WITHIN THE STRATOSPHERE.
AD-292 090 DIV. 2

RADIOACTIVE ISOTOPE DILUTION METHOD DETERMINATION SULFATE CONCENTRATION IN CR PLATING SOLUTIONS: PRECIPITATION.
AD-292 281 DIV. 20

***RADIOBIOLOGY**

BULLETIN OF EXPERIMENTAL MEDICINE AND BIOLOGY (USSR): DISTURBANCE IN THE REACTIONS OF THE HEMATOPOIETIC SYSTEM AT LATE POSTIRRADIATION PERIODS. THE EFFECT OF OXYGEN DEFICIENCY AND PROLONGED RADIAL ACCELERATION ON ANIMALS.
AD-292 232 DIV. 16

***RADIOCHEMISTRY**

RADIATION CHEMISTRY OF PETROLEUM HYDROCARBONS: NUCLEAR RADIATION IN THE PETROLEUM-REFINING INDUSTRY: PETROCHEMICAL SYNTHESES: RADIOLYSIS OF ALKANES: RADIATION AND THERMAL STABILITY OF AROMATIC HYDROCARBONS.
AD-292 606 DIV. 20

***RADIOFREQUENCY**

CHARACTERISTICS OF A 400 KC ELECTRIC ARC.
AD-292 336 DIV. 9

***RADIOFREQUENCY**
ATTENUATION

BROADBAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
AD-292 992 DIV. 8

***RADIOFREQUENCY ATTENUATORS**

HERO SUPPORTING STUDIES.
AD-293 476 DIV. 22

***RADIOFREQUENCY GENERATORS**

SAFETY MEASURES RECOMMENDED FOR RADIOFREQUENCY GENERATOR INSTALLATIONS.
AD-292 611 DIV. 8

***RADIOFREQUENCY PULSES**

AN INSTANCE OF AMPLITUDE ERROR DISCRETIZATION OF SIGNALS.
AD-292 607 DIV. 8

***RADIOFREQUENCY SPECTRUM ANALYZERS**

WIDE BAND SPECTRUM SURVEILLANCE SYSTEM.
AD-292 088 DIV. 25

***RADIOLOGICAL CONTAMINATION**

A COMPILATION OF RADIOACTIVE FALLOUT FROM A NUCLEAR REACTOR IN GREENLAND.
AD-293 640 DIV. 20

***RADIOPROTECTIVE DRUGS**
SYNTHESIS

RADIOPROTECTIVE DRUGS. SYNTHESIS OF AMINO-1,4-DITHIACYCLANES. REARRANGEMENTS OF NITROGEN MUSTARD-LIKE INTERMEDIATES WERE OVERCOME BY BLOCKING THE NITROGEN WITH THE BENZENESULFONYL GROUP AND LATER REMOVING IT BY REDUCTION WITH NA IN LIQUID NH3.
AD-292 908 DIV. 16

***RAMJET ENGINES**

RAMJET DESIGN CONSIDERATIONS.
AD-292 770 DIV. 27

***RAMJET ENGINES**
ACCEPTABILITY

TESTING OF RAMJET ENGINE IN RELATION TO THRUST, FUEL CONSUMPTION PERFORMANCE, ACCEPTANCE TEST DISCREPANCIES AND TEST FLUID CORRELATION.
AD-293 289 DIV. 27

***RAMJET PROPULSION**

COMPILATION OF 147 CHEMICAL COMPOUNDS, ORGANIC AND INORGANIC, FOR POSSIBLE USE AS RAMJET ENGINE FUELS OR FUEL ADDITIVES: PHYSICAL, CHEMICAL, AND THERMODYNAMIC PROPERTIES: SELF-IGNITION.
AD-293 681 DIV. 10

***REACTION (PSYCHOLOGY)**

PAIRED-ASSOCIATES LEARNING UNDER VARIATIONS IN OCCURRENCES OF RESPONSE MEMBERS FROM AN EXPERIMENTAL AND FROM AN ORIENTATIVE-THEORETICAL POINT OF VIEW.
AD-292 153 DIV. 28

***REAL VARIABLES**

AN INVESTIGATION OF THE APPLICATION OF NON-LINEAR MODELING WITH FUNCTIONS OF A SPECIAL TYPE
AD-292 106 DIV. 15

ANALYTIC CONTINUATION OF 4TH ORDER ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS IN TWO INDEPENDENT REAL VARIABLES ACROSS THE X-AXIS.
AD-293 211 DIV. 15

ANALYTIC CONTINUATION OF 4TH ORDER ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT REAL VARIABLES ACROSS AN ANALYTIC BOUNDARY (Y EQUALS 0).
AD-293 212 DIV. 15

***REDUCTION**

ELECTROREDUCTION OF AROMATIC NITRO COMPOUNDS IN NONAQUEOUS SOLUTIONS. PART I. REDUCTION OF NITROBENZENES IN ACID LIQUID AMMONIA SOLUTIONS.
AD-293 486 DIV. 4

***REFRACTORY MATERIALS**

ABSTRACTS OF ARTICLES ON HIGH STRENGTH ALLOYS, LIGHT METALS, NONMETALLICS, AND REFRACTORY METALS.
AD-293 270 DIV. 17

***REFRACTORY MATERIALS**
ALLOYS

EVALUATION OF PROCESSING METHODS ON MICROSTRUCTURE AND PROPERTIES OF MOLYBDENUM AND TUNGSTEN ALLOYS CONTAINING VARYING PROPORTIONS OF BORON, HAFNIUM, NIOBIUM, TITANIUM AND ZIRCONIUM.
AD-292 250 DIV. 17

***REFRACTORY MATERIALS**
BIBLIOGRAPHY

ABSTRACTS SELECTED REPORTS IN DEFENSE METALS INFORMATION CENTER: HEAT RESISTANT ALLOYS: METALS: REFRACTORY MATERIALS: COATINGS.
AD-291 965 DIV. 32

***REFRACTORY MATERIALS**
ELECTRICAL PROPERTIES

REFRACTORY OXIDES: MECHANISTIC UNDERSTANDING OF ELECTRICAL PROPERTIES OF VARIOUS METAL OXIDES. STUDIES ARE BEING MADE OF PURE ZIRCONIA AND ZIRCONIA STABILIZED WITH CALCIA: INFLUENCE OF CATION-CATION INTERACTION ON CONDUCTIVITY IN CHROMIA-ALUMINA SOLID SOLUTIONS.
AD-293 487 DIV. 14

REFRACTORY OXIDES. MEASUREMENT OF ELECTRICAL CONDUCTIVITY, THERMOELECTRIC POWER, TRANSFERENCE NUMBERS AS A FUNCTION OF TEMPERATURE AND OXYGEN PARTIAL PRESSURE.
AD-293 488 DIV. 14

***REINFORCED CONCRETE**

AN ECONOMICAL, ARCH-SHAPED SHELTER, UTILIZING PNEUMATICALLY-PLACED MORTAR, PROVIDES PROTECTION FOR 100 MEN AND AN OVERPRESSURE OF 100 PSI.
AD-292 930 DIV. 13

***REINFORCING MATERIALS**

AL2O3 WHISKERS FOR REINFORCING 80-20 NI-CR ALLOY AND IRON: TENSILE PROPERTIES: BONDING: H-REDUCED FE: FIBER LOADING.
AD-291 917 DIV. 14

DEVELOPMENT OF FIBER-REINFORCED METALS AND ALLOYS WITH HIGH STRENGTH-TO-WEIGHT RATIOS. HIGH ELASTIC MODULI: HOT EXTRUSION: FABRICATION: AL-BE ALLOYS.
AD-293 259 DIV. 17

***RELATIVITY THEORY**

DISCUSSION OF THE FOUNDATIONS OF RELATIVISTIC MECHANICS.
AD-293 438 DIV. 9

STRESS POTENTIALS. PATH DENSITIES. RELATIVISTIC THERMODYNAMICS.
AD-293 480 DIV. 25

***RELAXATION TIME**

NUCLEAR RELAXATION OF N-14 BY QUADRUPOLE INTERACTION IN MOLECULAR LIQUIDS.
AD-293 441 DIV. 20

***RELIABILITY**

RADAR TEST SET AN/APM-123: RADAR SET TS-1314.
AD-292 048 DIV. 8

PREDICTED AND MEASURED RELIABILITY INDEX OF RADIO SET AN/URC-32.
AD-292 176 DIV. 5

FORTRAN PROGRAM TO ESTIMATE CUMULATIVE SURVIVAL PROBABILITY AND VARIANCE.
AD-293 155 DIV. 30

THEORETICAL EXPLANATION OF OBSERVED DECREASING FAILURE RATE.
AD-293 692 DIV. 26

***RELIABILITY**
DETERMINATION

RELIABILITY DETERMINATION FOR GENERAL TRICHOTOMOUS SYSTEMS. A RECURSIVE TYPE OF PROCEDURE IS DEVELOPED.
AD-293 126 DIV. 22

***REMOTE CONTROL SYSTEMS**

REMOTE MONITORING AND CONTROL APPARATUS FOR LARGE DISPERSED SYSTEMS.
AD-292 195 DIV. 5

***REPORTS**

REVIEW OF BOOK 'PLANETS AND SATELLITES'.
AD-292 169 DIV. 32

***RESEARCH PROGRAM ADMINISTRATION**

DISCUSSION ON SOME OF THE ISSUES INVOLVED IN THE CONDUCT OF MILITARY RESEARCH AND DEVELOPMENT.
AD-292 652 DIV. 30

HISTORY OF MATHEMATICAL STATISTICS RESEARCH AT THE AERONAUTICAL RESEARCH LABORATORIES.
AD-292 975 DIV. 30

THE PERT SYSTEM AND ITS CHIEF MATHEMATICAL ASSUMPTIONS ARE ANALYZED.
AD-293 423 DIV. 33

PROTOTYPE DEVELOPMENT OF MODEL 385 AIR REFUELING STORE.
AD-293 628 DIV. 1

***RESEARCH PROGRAM ADMINISTRATION**
MATHEMATICS

REPORT ON RESEARCH DONE UNDER GRANT ON PSEUDO-CONCAVE AND -CONVEX COMPLEX SPACES: INCLUDES BIBLIOGRAPHY AND PERSONNEL INVOLVED.
AD-292 904 DIV. 19

***RESINS**
COATINGS

DETERMINATION OF PHTHALIC ANHYDRIDE IN COATING RESINS BY GAS-LIQUID CHROMATOGRAPHIC METHOD.
AD-293 160 DIV. 14

***RESINS**
PHYSICAL PROPERTIES

CONFORMAL COATINGS FOR PRINTED CIRCUIT ASSEMBLIES: EPOXY-, ACRYLIC-, AND POLYSTYRENE COATING SYSTEMS: PHYSICAL AND ELECTRICAL PROPERTIES: ADHESION AND HUMIDITY EFFECTS.
AD-293 234 DIV. 14

***RESPIRATION**
HEAT TRANSFER

A NEW INSTRUMENT, THE DIELECTRIC HYGROMETER, DESIGNED TO MEASURE WATER VAPOR IN EXPIRED AIR, IS DESCRIBED. TEMPERATURE AND WATER VAPOR CONTENT OF EXPIRED AIR WERE MEASURED IN STANDING RESTING SUBJECTS AT AMBIENT TEMPERATURES RANGING FROM 0 TO +80C.
AD-293 194 DIV. 16

***RESPIRATORS**
CONTROL SYSTEMS

EQUIPMENT TO ADMINISTER HALOTHANE ANESTHESIA TO CONTROL MECHANICAL VENTILATION, EXTERNAL HEART COMPRESSION TECHNIQUES, ANESTHESIA IN EMPHYSEMATOUS PATIENTS, A TEST-STRIP METHOD FOR DETERMINATION OF PLASMA CHOLINESTERASE, AND ELECTROMYOGRAPHIC STUDIES OF RESPIRATORY MUSCLES ARE DESCRIBED.
AD-293 404 DIV. 16

•RESPIRATORY SYSTEM

REACTIONS OF HEMOGLOBIN AND STEADY-STATES IN THE HUMAN RESPIRATORY SYSTEM: AN INVESTIGATION USING MATHEMATICAL MODELS AND AN ELECTRONIC COMPUTER.
AD-292 068 DIV. 16

•RHENIUM ALLOYS

RHENIUM SEGREGATION TO GRAIN BOUNDARIES AND THEIR INTERFACES IN ALLOYS WITH GROUP VI-A METALS: ELECTRICAL RESISTANCE OF THE ALLOYS IN VARIOUS ANNEALED STATES AND OVER A RANGE OF TEMPERATURES.
AD-293 105 DIV. 17

•RINGS

COMPATIBILITY OF O-RING SEAL MATERIAL WITH ETHYLENE GLYCOL AT TEMPERATURES FROM 150 TO 350 F.
AD-292 396 DIV. 19

•RIVETED JOINTS

MECHANICAL PROPERTIES OF SPOT WELDED, BUTT WELDED, AND RIVETED JOINTS OF HASTELLOY B335 AND HAYNES ALLOY NO. 25 NI BASE ALLOYS.
AD-293 096 DIV. 17

STRENGTH AND DRIVING CHARACTERISTICS OF COLD-HEADED B-120-VCA TI ALLOY RIVETS FASTENED INTO THIN STEEL STRIPS.
AD-293 099 DIV. 26

•RIVETS

ULTIMATE SHEAR STRENGTH OF 1/8 AND 5/32 INCH DIAMETER MONEL METAL, NICKEL BASE ALLOY, RIVET WIRE WITH STEEL SHEAR JIGS: YIELD STRENGTH IN AL ALLOY SHEET.
AD-292 296 DIV. 17

ULTIMATE SHEAR STRENGTH, DRIVING CHARACTERISTICS, AND CORROSIVE EFFECTS OF VASCOJET 1000 STEEL RIVETS IN ALUMINUM ALLOY SHEET.
AD-292 295 DIV. 26

STRENGTH AND DRIVING CHARACTERISTICS OF COLD-HEADED B-120-VCA TI ALLOY RIVETS FASTENED INTO THIN STEEL STRIPS.
AD-293 099 DIV. 26

•ROCKET CASES

EVALUATION OF PROPERTIES OF HIGH STRENGTH ALLOY STEELS FOR USE IN LARGE SOLID PROPELLANT ROCKET MOTOR CASES.
AD-292 258 DIV. 27

•ROCKET CASES
COMBUSTION CHAMBER LINERS

SEMI-INORGANIC ELASTOMERS - STANNOSILOXANE, TITANOSILOXANES, ALUMINOSILOXANES, ARSENOSILOXANES, STANNOSILOXANE-BASED COMPOSITIONS APPEARED SUPERIOR TO SILICONE-BASED COMPOSITIONS IN INSULATIVE CAPABILITY BUT INFERIOR TO NITRILE RUBBER-PHENOLIC RESINS AS ABLATIVE INSULATORS.
AD-293 422 DIV. 27

•ROCKET CASES
MANUFACTURING METHODS

FABRICATION OF PROTOTYPE ROCKET MOTORCASE BY CRYOGENIC STRETCH-FORMING.
AD-292 938 DIV. 27

•ROCKET MOTOR NOZZLES

AIR INJECTION INTO AN OVEREXPANDED, TWO-DIMENSIONAL NOZZLE.
AD-292 179 DIV. 9

•ROCKET MOTORS

AIR DISPERSION OF TOXIC ROCKET EXHAUST.
AD-293 432 DIV. 25

•ROCKET OXIDIZERS
SPECIFIC IMPULSE

PROPELLANT PERFORMANCE AND GAS COMPOSITION HANDBOOK. PERFORMANCE TABLES OBTAINED BY PLOTTING DATA FROM MACHINE CALCULATIONS AND INTERPOLATING TO OBTAIN VACUUM SPECIFIC IMPULSES FOR INTEGRAL VALUES OF THE AREA RATIO. TABLES OF GAS COMPOSITIONS AND PERFORMANCES.
AD-293 403 DIV. 10

•ROCKET PROPULSION

LONG LIFE CLOSED-LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
AD-293 438 DIV. 25

•ROCKETS
AIR TO AIR

SERVICEABILITY TEST OF HEATER BLANKET FOR THE MB-1 ROCKET.
AD-293 698 DIV. 22

•ROLL
ANALYSIS

HANDLING QUALITIES IN SINGLE-LOOP ROLL TRACKING TASKS.
AD-293 236 DIV. 1

•ROTATION

ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
AD-292 118 DIV. 25

EFFECT OF SYMMETRY ON THE LINEARIZED FORCE SYSTEM.
AD-293 631 DIV. 22

•ROTOR BLADES

TEMPERATURE FIELD AND GRADIENTS IN WELDED DISK TYPE TURBINE ROTOR UNDER STARTING CONDITIONS: HEAT TRANSFER COEFFICIENTS.
AD-292 206 DIV. 27

•RUBBER COATINGS

FIRE RESISTANCE TESTS ON NEOPRENE COATED FIBERGLASS CLOTH USED FOR CARGO COMPARTMENT LINERS.
AD-292 297 DIV. 14

•RUBBER SEALS

FAIRPRENE INTEGRAL FUEL TANK SEALING - MATERIAL - SWELLING CHARACTERISTICS WHEN IMMERSED IN 10 AVIATION FUELS AND 10 TOLUOL (AROMATIC HYDROCARBON) - AVIATION FUEL MIXTURES.
AD-292 287 DIV. 14

•SAFETY

ACTIVITY REPORT ON AIRPORT FACILITY INCLUDING TRAFFIC CONTROL, DISPLAY SYSTEMS, LIGHTING, COMMUNICATIONS, AND LANDING SYSTEMS.
AD-292 072 DIV. 1

SAFETY MEASURES RECOMMENDED FOR RADIOFREQUENCY GENERATOR INSTALLATIONS.
AD-292 411 DIV. 8

•SAFETY DEVICES
ARMING DEVICES

XM-52 ARM-SAFE DEVICE.
AD-293 620 DIV. 22

•SALIVA
PROTEINS

AN IMMUNOLOGICAL STUDY OF SALIVARY PROTEINS. METHODS OF STERILIZATION OF THE SALIVA ARE COMPARED.
AD-292 942 DIV. 16

•SAMPLING

AN INSTANCE OF AMPLITUDE ERROR DISCRETIZATION OF SIGNALS.
AD-292 607 DIV. 8

•SANDWICH CONSTRUCTION

THEORETICAL TREATISE ON SHEAR STABILITY OF FLAT PANELS OF SANDWICH CONSTRUCTION.
AD-291 998 DIV. 14

MECHANICAL PROPERTIES OF AL AND REINFORCED AL HONEYCOMB CORES: DENSITY, FOIL THICKNESS, COMPRESSIVE STRENGTH, AND SHEAR CHARACTERISTICS.
AD-291 995 DIV. 17

EFFECT OF CURE THICKNESS ON SHEAR PROPERTIES OF AL HONEYCOMB CORE MATERIAL: PREPARATION OF SPECIMENS AND EVALUATION PROCEDURES.
AD-292 008 DIV. 17

CALCULATION VIBRATION DAMPING SANDWICH CONSTRUCTION FROM ELASTIC PROPERTIES, ENERGY ABSORPTION: DIRECT STRESS VIBRATION FACING MATERIALS, AND SHEAR VIBRATION CORE MATERIALS.
AD-293 412 DIV. 14

•SANDWICH PANELS

THEORETICAL TREATISE ON SHEAR STABILITY OF FLAT PANELS OF SANDWICH CONSTRUCTION.
AD-291 998 DIV. 14

EFFECT TIMES TO REACH CURE TEMPERATURE ON LAP SHEAR STRENGTH AF-31 AND PLASTILOCK 690 ADHESIVE AL ALLOY SKIN-BONDED SPECIMENS.
AD-292 298 DIV. 14

•SANDWICH PANELS
ALUMINUM

COMPRESSIVE AND SHEAR PROPERTIES OF 2 CONFIGURATIONS OF SANDWICH CORES OF CORRUGATED AL FOIL. COMPRESSIVE AND SHEAR STRENGTH VALUES WERE LOWER FOR CROSSBANDED CORE THAN FOR HONEYCOMB CORE.
AD-293 413 DIV. 1

•SATELLITE RENDEZVOUS VEHICLES
ROCKET PROPULSION

OPTIMIZATION OF SATELLITE TRAJECTORIES OPTIMIZATION AND CONTROL AND PROPULSION SYSTEMS CONTROL.
AD-292 729 DIV. 12

•SATELLITE VEHICLE TRAJECTORIES
ROCKET PROPULSION

OPTIMIZATION OF SATELLITE TRAJECTORIES OPTIMIZATION AND CONTROL AND PROPULSION SYSTEMS CONTROL.
AD-292 729 DIV. 12

•SATELLITE VEHICLE TRAJECTORIES
VELOCITY

OPTIMUM SATELLITE DISPENSING VELOCITIES FOR AN EQUATORIAL HIGH ALTITUDE NONSYNCHRONIZED SATELLITE COMMUNICATION SYSTEM.
AD-292 995 DIV. 12

•SATELLITE VEHICLES

INVESTIGATION OF HIGH FREQUENCY PROPAGATION IN THE IONOSPHERE USING SATELLITE TRANSMISSIONS.
AD-293 430 DIV. 8

ACQUISITION AND TRACKING LIMITATIONS FOR TWO HYPOTHETICAL OPTICAL SPACE COMMUNICATION LINKS: ONE BETWEEN AN EARTH SATELLITE AND A MOON SATELLITE AND ANOTHER BETWEEN AN EARTH SATELLITE AND A SPACE VEHICLE. TYPICAL ACQUISITION AND TRACKING SUBSYSTEMS.
AD-293 452 DIV. 5

•SATELLITE VEHICLES
COMMUNICATION SYSTEMS

ORBITAL ASPECTS OF NON-SYNCHRONOUS COMMUNICATION SATELLITE SYSTEMS.
AD-292 960 DIV. 12

•SATELLITE VEHICLES
DISTRIBUTION

OPTIMUM SATELLITE DISPENSING VELOCITIES FOR AN EQUATORIAL HIGH ALTITUDE NONSYNCHRONIZED SATELLITE COMMUNICATION SYSTEM.
AD-292 995 DIV. 12

•SATELLITE VEHICLES
DOPPLER SYSTEMS

FACTORS CURRENTLY INFLUENCING RMS ERROR IN DOPPLER DATA FROM THE TRANSIT SATELLITE.
AD-291 958 DIV. 6

•SATELLITE VEHICLES
SCIENTIFIC RESEARCH

A NEW SERIES OF INVESTIGATIONS: AN ARTICLE FROM IZVESTIYA. RADIATION IN SPACE.
AD-292 198 DIV. 12

SCIENTIFIC INVESTIGATIONS PERFORMED IN CONJUNCTION WITH COSMOS III AND COSMOS V: A TRANSLATION FROM PRAVDA.
AD-292 198 DIV. 12

•SATELLITE VEHICLES
SPACE FLIGHT

BASIC RESULTS FROM THE FIRST MANNED FLIGHT IN COSMIC SPACE. A TRANSLATION FROM PRAVDA.
AD-292 620 DIV. 12

•SATELLITE VEHICLES
TRACKING

ORBIT DETERMINATION AND MAINTENANCE.
AD-292 269 DIV. 12

•SATELLITES

REVIEW OF BOOK 'PLANETS AND SATELLITES'.
AD-292 169 DIV. 32

•SCALE

CLEANING SCALE FROM ROLLED METAL BY PASSING THE METAL THROUGH A BATH WHERE IT IS SUBJECTED TO POWERFUL ELECTROHYDRAULIC SHOCKS.
AD-292 181 DIV. 26

•SCHISTOSOMA
ALASKA

THE DISTRIBUTION AND PREVALENCE OF THE DERMATITIS-PRODUCING CERCARIAE OF BIRD AND MAMMAL SCHISTOSOMES IN THE WATERS OF ALASKA.
AD-293 180 DIV. 16

***SCIENTIFIC PERSONNEL**
EFFECTIVENESS

CRITIQUE ON DETERMINING SCIENTISTS FROM CRACKPOTS.
AD-293 264 DIV. 28

***SCIENTIFIC REPORTS**

ABSTRACTS SELECTED REPORTS IN DEFENSE METALS INFORMATION CENTER! HEAT RESISTANT ALLOYS! METALS! REFRACTORY MATERIALS! COATINGS.
AD-291 965 DIV. 32

REVIEW OF AIR FORCE MATERIALS RESEARCH AND DEVELOPMENT PROGRAM. ABSTRACTS OF REPORTS CONCERNED WITH THE FOLLOWING! METALS AND CERAMICS! NON-METALLIC MATERIALS. PHYSICS. MANUFACTURING TECHNOLOGY! APPLICATION STUDIES.
AD-292 152 DIV. 14

INVESTIGAIONS IN THE FIELD OF SURFACE FORCES! COLLECTION OF 8 TECHNICAL REPORTS TRANSLATED FROM RUSSIAN.
AD-292 623 DIV. 25

***SEA WATER**
SURFACES

ANALYSIS OF LIPID METABOLITES OF PLANKTON ORGANISMS (SARGASSUM AND CTENOPHORE) AND ASSOCIATED WATER SURFACE FILMS.
AD-293 238 DIV. 16

***SEALING COMPOUNDS**

RESISTANCE OF VARIOUS ORGANIC MATERIALS TO SKYDROL 500 HYDRAULIC FLUID IMMERSION.
AD-292 285 DIV. 14

FAIRBRENE INTEGRAL FUEL TANK SEALING - MATERIAL - SWELLING CHARACTERISTICS WHEN IMMERSED IN 10 AVIATION FUELS AND 10 TOLUOL (AROMATIC HYDROCARBON) - AVIATION FUEL MIXTURES.
AD-292 287 DIV. 14

***SEALS**

DEVELOPMENT OF COMPOSITE MATERIALS FOR USE AS STATIC AND DYNAMIC SEALS. CRYOGENIC TO 2000 F UP TO 500 PSI. RECIPROCATING SHAFTS! SEALING CABINS OF SPACESHIPS.
AD-291 984 DIV. 14

COMPATIBILITY OF O-RING SEAL MATERIAL WITH ETHYLENE GLYCOL AT TEMPERATURES FROM 150 TO 350 F.
AD-292 296 DIV. 14

***SECONDARY EMISSION**

HIGH GAIN TRANSMISSION SECONDARY EMISSION FILMS! IMPROVEMENT OF LOW DENSITY KCL DYNODES! EVAPORATION TECHNIQUES AND STRUCTURAL STUDIES.
AD-292 707L DIV. 8

***SEDIMENTATION**

FLUORESCENT COATINGS ON COARSE SEDIMENTS. MANY ASPECTS OF BEACH MORPHOLOGY PROVED AMENABLE TO STUDY USING COATED PARTICLES.
AD-292 155 DIV. 30

***SEISMIC WAVES**
UNDERGROUND EXPLOSIONS

LONG RANGE SEISMIC MEASUREMENTS PROGRAM FILM SEISMOGRAMS OF THE HYRAX UNDERGROUND NUCLEAR EXPLOSION.
AD-293 462 DIV. 6

LONG RANGE SEISMIC MEASUREMENTS PROGRAM FILM SEISMOGRAMS MADE IN CONNECTION WITH THE HARDHAT UNDERGROUND NUCLEAR EXPLOSION.
AD-293 469 DIV. 6

VISUAL ANALYSIS OF SEISMOGRAMS AS RECORDED AT LONG RANGE SEISMIC MEASUREMENT SITES DURING THE AARDVARK UNDERGROUND NUCLEAR EXPLOSION EVENT.
AD-293 482 DIV. 6

VISUAL ANALYSIS OF SEISMOGRAMS AS RECORDED AT LONG RANGE SEISMIC MEASUREMENT SITES DURING THE CHINCHILLA UNDERGROUND NUCLEAR EXPLOSION EVENT.
AD-293 483 DIV. 6

***SEMICONDUCTING FILMS**

HALL EFFECT INVESTIGATIONS! GALVANOMAGNETIC MEASUREMENTS ON EVAPORATED THIN FILMS OF INSB ON GLASS SUBSTRATES! MAGNETORESTRICTIVE CONTRIBUTION OF INSB FILMS.
AD-293 433 DIV. 27

***SEMICONDUCTORS**

A STUDY OF HIGH-LOW JUNCTIONS AND HIGH-LOW JUNCTION SEMICONDUCTOR DEVICES.
AD-291 922 DIV. 25

A LOW NOISE, LOW DISTORTION TRANSISTOR. PLANAR PASSIVATED EPITAXIAL SILICON DEVICES BOTH NPN AND PNP.
AD-292 346 DIV. 8

OCTAVE-TUNABLE TUNNEL DIODE OSCILLATORS.
AD-293 216 DIV. 8

CONTINUING RESEARCH ON STATIC ENERGY CONVERSION. INCLUDING MEASUREMENT OF NERNST COEFFICIENT
AD-293 408 DIV. 7

***SEMICONDUCTORS**
RADIATION EFFECTS

RADIATION ENHANCED DIFFUSION IN SILICON. DESIGN OF A MICROCALORIMETER. STORED ENERGY MEASUREMENT IN IRRADIATED GE. DEFECT MOBILITY IN IRRADIATED GE.
AD-292 762 DIV. 25

***SERIES**

AN INVESTIGATION OF THE APPLICATION OF NON-LINEAR MODELING WITH FUNCTIONS OF A SPECIAL TYPE
AD-292 106 DIV. 15

FINITE ASYMPTOTIC EXPANSIONS OF SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS (ELLIPTIC SECOND ORDER IN TWO VARIABLES).
AD-293 215 DIV. 15

INTERVAL ARITHMETIC AND AUTOMATIC ERROR ANALYSIS IN DIGITAL COMPUTING.
AD-293 442 DIV. 30

***SERVOMECHANISMS**

NYQUIST-LIKE STABILITY CRITERIA AND SUBSTITUTION ARE USED TO ESTABLISH CONVERGENCE PROPERTIES OF LINEAR TIME-VARYING SYSTEMS. ALLOWING COMPLETE DESIGN OF ADAPTIVE CONTROL SYSTEM FROM THE REFERENCE-MODEL, WITH GUARANTEED CONVERGENCE.
AD-292 688 DIV. 15

***SERVOMECHANISMS**
PHYSIOLOGY

A VARIABLE IMPEDANCE MUSCLE STIMULATOR FOR INVESTIGATION OF THE SERVO PROPERTIES OF THE GASTROCNEMIUS MUSCLE REFLEX ARC OF THE CAT IS DESCRIBED.
AD-293 468 DIV. 8

***SHEAR STRESSES**

EFFECT TIMES TO REACH CURE TEMPERATURE ON LAP SHEAR STRENGTH AF-31 AND PLASTILOCK 480 ADHESIVE AL ALLOY SKIN-BONDED SPECIMENS.
AD-292 298 DIV. 14

***SHEETS**

PILOT PRODUCTION OF TANTALUM ALLOY SHEET.
AD-292 062 DIV. 17

A MAGNETOGASDYNAMIC ASYNCHRONOUS GENERATOR.
AD-292 654 DIV. 9

***SHEETS**
CORROSION

MECHANICAL AND CORROSIVE PROPERTIES OF 2024-T3A AL ALLOY SHEET MATERIAL! TENSILE PROPERTIES! ELONGATION! ELASTICITY! STRESS-STRAIN CURVES! SALT SPRAY EXPOSURE TESTS.
AD-292 271 DIV. 17

***SHEETS**
MECHANICAL PROPERTIES

SURVEY OF NOTCH-TOUGHNESS PROPERTIES OF SHIP PLATES! FRACTURE MECHANICS! SPECIFICATIONS! TENSILE TESTS! CHARPY V-NOTCH TESTS! COMPOSITION ANALYSIS.
AD-292 700 DIV. 17

***SHIP HULLS**
VIBRATION

EFFECT OF HULL VIBRATIONS OF VARIOUS ROW ANTI-PITCHING FIN CONFIGURATIONS.
AD-293 491 DIV. 31

***SHIP PLATES**

SURVEY OF NOTCH-TOUGHNESS PROPERTIES OF SHIP PLATES! FRACTURE MECHANICS! SPECIFICATIONS! TENSILE TESTS! CHARPY V-NOTCH TESTS! COMPOSITION ANALYSIS.
AD-292 700 DIV. 17

***SHOCK**

THE RESULTS OF A PRELIMINARY STUDY INTENDED TO ANALYZE THE EFFECTS OF THE SUDDEN APPLICATION OF A HEAT SOURCE ON ONE SIDE OF A PLANE OR CYLINDRICAL WALL IS PRESENTED. EXPERIMENTAL INFORMATION FOR A RELIABLE ANALYSIS OF THE EFFECTS OF THE THERMAL SHOCK.
AD-292 265 DIV. 25

***SHOCK TUBES**

SHOCK TUBE SPECTROSCOPY IN THE UV REGION! IOZ BAND SYSTEM! BAND HEADS OF TINI BA ABSORPTION SPECTRUM.
AD-292 266 DIV. 25

***SHOCK TUBES**
HEAT TRANSFER

ASSESSMENT OF ERRORS INVOLVED IN THICK-FILM HEAT TRANSFER MEASUREMENTS. CALIBRATION PROCEDURE FOR THE THICK-FILM GAGE CONSTANT P.CL/(R ALPHA SUB 01).
AD-292 255 DIV. 30

***SHOCK TUBES**
INSTRUMENTATION

SHOCK TUNNEL STUDIES OF THE AERODYNAMICS OF ATMOSPHERIC ENTRY.
AD-292 016 DIV. 9

***SHOCK TUBES**
NOZZLES

DESIGN AND PERFORMANCE OF A TWO-DIMENSIONAL, SHARP-EDGE-THROAT, MACH 3 NOZZLE IN A LABORATORY SHOCK TUBE.
AD-292 180 DIV. 25

***SIGNAL-TO-NOISE RATIO**

A COMPUTER-AUGMENTED TECHNIQUE FOR THE DESIGN OF LIKELIHOOD-RATIO RECEIVERS.
AD-292 181 DIV. 8

***SIGNAL-TO-NOISE RATIO**
RADIO RECEIVERS

DETECTION OF A RANDOMLY DISTORTED SIGNAL IN GAUSSIAN NOISE.
AD-291 982 DIV. 6

***SILANES**

SYNTHESIS ORGANOSILICON MONOMERS WITH NITRILE GROUPS! SILANES! TRICHLOROSILANE ADDITION TO CYLLOHEXENECARBONITRILE.
AD-292 663 DIV. 4

***SILICON**
RADIATION EFFECTS

RADIATION ENHANCED DIFFUSION IN SILICON. DESIGN OF A MICROCALORIMETER. STORED ENERGY MEASUREMENT IN IRRADIATED GE. DEFECT MOBILITY IN IRRADIATED GE.
AD-292 762 DIV. 25

***SILICON COMPOUNDS**
SYNTHESIS

SYNTHESIS ORGANOSILICON MONOMERS WITH NITRILE GROUPS! SILANES! TRICHLOROSILANE ADDITION TO CYLLOHEXENECARBONITRILE.
AD-292 663 DIV. 4

***SILVER**
SINGLE CRYSTALS

FATIGUE STUDIES OF METAL CRYSTALS. SINGLE CRYSTALS OF SILVER AND ZINC WERE FATIGUED IN ALTERNATE HANDLING AT CONSTANT STRAIN AMPLITUDE OF 0.12% AND 0.2% FOR AG AND 0.01% FOR ZN.
AD-293 471 DIV. 17

***SILVER COMPOUNDS**

EFFECT OF RADIATION ON LUMINESCENCE PURE AND MIXED AGCL OR AGBR PHOSPHORS.
AD-292 665 DIV. 25

***SIMULATION**

STELLAR SIMULATOR FEASIBILITY STUDY.
AD-292 649 DIV. 2

METHODS OF APPLICATION OF COMPUTER SIMULATION OF NEUROPHYSIOLOGICAL AND SOCIAL SYSTEMS.
AD-293 241 DIV. 90

***SIMULATION**
LABORATORY EQUIPMENT

ANNUAL SUMMARY OF WORK ON LABORATORY SIMULATION OF LUNAR LUMINESCENCE.
AD-292 725 DIV. 2

***SINGLE CRYSTALS**

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS. MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES. DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE PARAMAGNETIC SALTS. POSSIBILITY OF OBSERVING THE MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON COMPLEXES IN CDS AND CDSE.
AD-292 326 DIV. 25

*SINGLE CRYSTALS
ALUMINUM

ORIGIN OF DEFORMATION BANDS. DEVELOPMENT OF TECHNIQUES FOR THE STUDY OF THE RELATION BETWEEN ACCIDENTAL BENDINGS AND THE NUCLEATION OF DEFORMATION BANDS.
AD-292 976 DIV. 17

*SINGLE CRYSTALS
ELECTRICAL PROPERTIES

FAILURE MECHANISMS IN FERROELECTRIC AND NON-LINEAR DIELECTRICS; ELECTROMECHANICAL AND BREAKDOWN MEASUREMENTS; HIGH VOLTAGE PULSE GENERATOR; OXYGEN DIFFUSION; ELECTROSTRICTIVE AND ELASTIC CONSTANTS.
AD-293 266 DIV. 25

*SINGLE CRYSTALS
FATIGUE (MECHANICS)

FATIGUE STUDIES OF METAL CRYSTALS. SINGLE CRYSTALS OF SILVER AND ZINC WERE FATIGUED IN ALTERNATE HANDLING AT CONSTANT STRAIN AMPLITUDE OF 0.124 AND 0.2% FOR Ag AND 0.018 FOR Zn.
AD-293 471 DIV. 17

*SINGLE CRYSTALS
GROWTH

HIGH-TEMPERATURE VAPOR DEPOSITION GROWTH OF SINGLE CRYSTALS OF Sn (IV) AND Cd OXIDES.
AD-292 114 DIV. 25

GROWTH OF GALLIUM ARSENIDE SINGLE CRYSTALS.
AD-292 709 DIV. 25

*SINGLE CRYSTALS
ZINC

DISLOCATION MOBILITY IN Zn SINGLE CRYSTALS. DISLOCATION DENSITY AND CONFIGURATION WERE DETERMINED BEFORE AND AFTER STATIC LOADING AND STRESS PULSE LOADING.
AD-293 445 DIV. 25

*SINTERING

RELATION OF MECHANICAL, TEXTURAL, AND THERMAL EXPANSION PROPERTIES TO STRUCTURE IN SINTERED ALUMINUM POWDER FROM 550 TO 800 C.
AD-292 061 DIV. 17

*SKIN
EXCRETION

THE DERMAL EXCRETION OF MINERALS AND ITS POSSIBLE RELATION TO MINERAL BALANCE AND REQUIREMENTS (SODIUM, POTASSIUM, IRON, MAGNESIUM, AND PHOSPHORUS.)
AD-292 946 DIV. 16

*SLEEP
INHIBITION

EFFECTS OF IPRONIAZID ON AVOIDANCE BEHAVIOR IN THE SLEEP DEPRIVED RAT.
AD-292 710 DIV. 28

*SLEEP
PHYSIOLOGY

ELECTROPHYSIOLOGICAL PROPERTIES OF THE NEURAL MECHANISM UNDERLYING SLEEP.
AD-292 999 DIV. 16

*SLIDES

A THEORY TO EXPLAIN CATASTROPHIC GLACIER ADVANCES BASED ON A PREVIOUSLY DEVELOPED GLACIER SLIDING THEORY.
AD-292 934 DIV. 2

*SLOT ANTENNAS

A LIGHTWEIGHT, MINIATURE SYSTEM FOR AUTOMATICALLY CONTROLLING THE RADIATION PATTERN OF BEACON ANTENNA ARRAYS MOUNTED ON MISSILES AND AIRCRAFT.
AD-292 661 DIV. 8

ELECTRONIC BROADBANDING OF ANTENNAS; ADMITTANCE OF A RECTANGULAR SLOT BACKED BY A RECTANGULAR CAVITY; SLOT ANTENNA IMPEDANCE MEASUREMENTS; AND HALLEN'S METHOD IN THE PROBLEM OF A CAVITY BACKED RECTANGULAR SLOT ANTENNA ARE SOME ULF ANTENNA-TECHNIQUES DISCUSSED.
AD-293 276 DIV. 8

*SNAILS
SCHISTOSOMA

THE DISTRIBUTION AND PREVALENCE OF THE DERMATITIS-PRODUCING CERCARIAE OF BIRD AND MAMMAL SCHISTOSOMES IN THE WATERS OF ALASKA.
AD-293 189 DIV. 16

*SOCIOLOGY

THE POTENTIAL INFLUENCE OF CERTAIN PRE-SITUATIONAL FACTORS IN ROLE FUNCTIONING.
AD-292 251 DIV. 32

*SOCIOLOGY
GROUP DYNAMICS

SOCIAL INFLUENCES ON SMALL GROUP BEHAVIOR, LEADERSHIP, JUDGMENT, AND PROPAGANDA.
AD-293 267 DIV. 32

*SOCIOMETRICS

THE POTENTIAL INFLUENCE OF CERTAIN PRE-SITUATIONAL FACTORS IN ROLE FUNCTIONING.
AD-292 251 DIV. 32

*SOCIOMETRICS
BEHAVIOR

SOCIAL INFLUENCES ON SMALL GROUP BEHAVIOR, LEADERSHIP, JUDGMENT, AND PROPAGANDA.
AD-293 267 DIV. 32

*SODIUM

INSTRUMENTATION FOR MEASUREMENT OF VAPOR PRESSURE OF ALKALI METALS (Cs, K, Na, Li) FROM 10 TO THE -5TH POWER TO 10 TO THE -2ND POWER MM HG.
AD-292 216 DIV. 4

*SOILS
MOISTURE

STUDIES DEALING WITH THE PHYSICAL PROCESSES INVOLVED IN THE EXCHANGE OF ENERGY BETWEEN THE ATMOSPHERE AND THE EARTH'S SURFACE.
AD-293 450 DIV. 2

*SOILS
WATER

THEORIES OF WATER MOVEMENT IN SOILS.
AD-292 941 DIV. 2

*SOLAR CELLS

A CAVITY GENERATOR, USING CESIUM VAPOR, IS USED AS A SOLAR THERMIONIC GENERATOR.
AD-292 143 DIV. 7

*SOLAR CELLS
MATERIALS

GROWTH OF GALLIUM ARSENIDE SINGLE CRYSTALS.
AD-292 709 DIV. 25

*SOLAR ENERGY
RADIATION EFFECTS

THEORETICAL INVESTIGATION ON ENERGY GAIN BY ABSORPTION OF SOLAR RADIATION IN CLOUDS.
AD-292 924 DIV. 25

*SOLAR FLARES

FILAMENT DISAPPEARANCES, FLARE SPRAYS, AND LOOP PROMINENCES OF SACRAMENTO PEAK FLARES.
AD-291 981 DIV. 2

*SOLID STATE PHYSICS

A STUDY OF HIGH-LOW JUNCTIONS AND HIGH-LOW JUNCTION SEMICONDUCTOR DEVICES.
AD-291 922 DIV. 25

S-BAND SOLID-STATE RECEIVERS. A DETECTOR AMPLIFIER COMPOSED OF SEMICONDUCTOR AND OTHER SOLID-STATE COMPONENTS. A TUNABLE YIG PRE-SELECTOR, A TRANSISTORIZED BALANCED MIXER, A BROADBAND IF AMPLIFIER.
AD-292 129 DIV. 8

EFFECTIVENESS OF SHEARING STRESSES IN ACCELERATING SOLID PHASE REACTIONS AT LOW TEMPERATURES AND HIGH PRESSURES; P-T DIAGRAM; TRANSITION KINETICS.
AD-292 309 DIV. 25

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS. MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES. DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE PARAMAGNETIC SALTS. POSSIBILITY OF OBSERVING THE MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON COMPLEXES IN CDS AND CDSE.
AD-292 324 DIV. 25

DEVELOPMENT OF X-RAY FLUORESCENCE ANALYSIS TECHNIQUES FOR SMALL SAMPLES; A PROTOTYPE ATMOSPHERIC ELECTRON PROBE.
AD-293 426 DIV. 25

*SOLID STATE PHYSICS
LIMITERS

CONTINUING RESEARCH ON BROAD-BAND SOLID-STATE LIMITERS FOR PROTECTING RECEIVERS.
AD-292 133 DIV. 25

*SOLIDS

CONTINUING RESEARCH ON STATIC ENERGY CONVERSION, INCLUDING MEASUREMENT OF NERNST COEFFICIENTS.
AD-293 408 DIV. 7

*SOLIDS
HEAT TRANSFER

THERMAL CONDUCTIVITY OF MOLDED AND PYROLYTIC GRAPHITES; ANISOTHOPIC SOLIDS; HIGH TEMPERATURE RESEARCH; TEST METHODS.
AD-292 326 DIV. 14

*SOLIDS
LANDING AIDS

A LISTING OF REPORTS WITH ABSTRACTS, CONCERNING MAGNETIC AND STRUCTURE PROPERTIES OF SOLIDS AND SOLUTIONS.
AD-292 905 DIV. 25

*SOLIDS
REACTION KINETICS

EFFECTIVENESS OF SHEARING STRESSES IN ACCELERATING SOLID PHASE REACTIONS AT LOW TEMPERATURES AND HIGH PRESSURES; P-T DIAGRAM; TRANSITION KINETICS.
AD-292 309 DIV. 25

*SONAR EQUIPMENT
UNDERWATER COMMUNICATION SYSTEMS

UNDERWATER COMMUNICATIONS SET AN/UQC-1(XG-1).
AD-291 990 DIV. 5

*SPACE CAPSULES
MANNED

BASIC RESULTS FROM THE FIRST MANNED FLIGHT IN COSMIC SPACE. A TRANSLATION FROM PRAVDA.
AD-292 620 DIV. 12

*SPACE ENVIRONMENTAL CONDITIONS

A THEORETICAL ANALYSIS OF CERENKOV POWER GENERATION FOR VARIOUS BEAM GEOMETRIES AND SOME EXPERIMENTAL TECHNIQUES.
AD-292 966 DIV. 5

*SPACE ENVIRONMENTAL CONDITIONS
LOW PRESSURE RESEARCH

EFFECTS OF VACUUM, AS FOUND IN SPACE, ON PLASTICS, METALS, ELASTOMERS, OXIDES, AND LUBRICANTS. VACUUM TERMINOLOGY, PHYSICAL CONSTANTS AND CONCEPTS OF SPACE VACUUM.
AD-292 929 DIV. 14

*SPACE FLIGHT
BIOLOGY

PAPERS PRESENTED AT A SYMPOSIUM ON BIOLOGISTICS FOR SPACE SYSTEMS.
AD-292 713 DIV. 16

*SPACE FLIGHT
COSMIC RAYS

EFFECTS OF GALACTIC COSMIC RADIATION AND MANNED SPACE FLIGHT.
AD-292 077 DIV. 16

*SPACE FLIGHT
MILITARY TRAINING

FLIGHT TRAINING OF ASTRONAUTS. A TRANSLATION FROM PRAVDA.
AD-292 600 DIV. 1

PREPARATION OF MAN FOR COSMIC FLIGHTS. A TRANSLATION FROM KOMMUNIST.
AD-292 615 DIV. 1

*SPACE FLIGHT
USSR

THE PRINCIPLES OF LIFE SUPPORT IN SPACE USED BY SOVIET SPECIALISTS AT THE PRESENT TIME FOR ORBITAL FLIGHTS AND THOSE BEING DISCUSSED AND DEVELOPED FOR FUTURE LONG-RANGE MISSIONS HAVE BEEN EXTRACTED FROM SOVIET NEWSPAPER ARTICLES AND TASS REPORTS.
AD-291 910 DIV. 16

A REVIEW BASED ON SOVIET OPEN-LITERATURE SOURCES (CHIEFLY NEWSPAPERS) PUBLISHED IN THE PERIOD AUGUST-OCTOBER 1962, CONCERNING THE MEDICAL AND BIOLOGICAL ASPECTS OF THE VOSTOK-3 AND VOSTOK-4 FLIGHTS, INCLUDING SELECTION OF ORBITS, PHYSICAL AND PSYCHOLOGICAL PREPARATION, MEDICAL MONITORING, RADIATION PROTECTION, DIET, CABIN ECOLOGY, AND PROJECTED PROBLEMS FOR INTERPLANETARY FLIGHT.
AD-291 911 DIV. 16

SELECTED TRANSLATED ARTICLES FROM ZEMLYA-KOSMOS-ZEMLYA ON RUSSIAN SPACE FLIGHTS.
AD-292 228 DIV. 1

*SPACE MEDICINE

TRANSLATION ON WEIGHTLESSNESS DURING RECENT SPACE FLIGHTS OF RUSSIAN COSMONAUTS, TITOV AND GAGARIN. PROBLEMS ENCOUNTERED DURING THEIR FLIGHTS.
AD-292 227 DIV. 16

***SPACE MEDICINE**
USSR

THE PRINCIPLES OF LIFE SUPPORT IN SPACE USED BY SOVIET SPECIALISTS AT THE PRESENT TIME FOR ORBITAL FLIGHTS AND THOSE BEING DISCUSSED AND DEVELOPED FOR FUTURE LONG-RANGE MISSIONS HAVE BEEN EXTRACTED FROM SOVIET NEWSPAPER ARTICLES AND TASS REPORTS.
AD-291 910 DIV. 16

***SPACESHIPS**

RADIOELECTRONICS - APPLICATIONS TO SPACESHIPS AND SPACE FLIGHT. USSR TRANSLATION.
AD-292 237 DIV. 8

ACQUISITION AND TRACKING LIMITATIONS FOR TWO HYPOTHETICAL OPTICAL SPACE COMMUNICATION LINKS: ONE BETWEEN AN EARTH SATELLITE AND A MOON SATELLITE AND ANOTHER BETWEEN AN EARTH SATELLITE AND A SPACE VEHICLE. TYPICAL ACQUISITION AND TRACKING SUBSYSTEMS.
AD-293 452 DIV. 5

***SPACESHIPS**
MANEUVERABILITY

OPTIMAL MODE SWITCHING IN TRANSFER TRAJECTORIES.
AD-293 132 DIV. 12

***SPALLATION**
HYPERVELOCITY PROJECTILES

HYPERVELOCITY IMPACT PHENOMENA. SPALLATION OF THIN METAL PLATES.
AD-293 457 DIV. 22

***SPECTROGRAPHIC ANALYSIS**

FLUX AND SPECTRAL MEASUREMENTS OF PRIMARY AND MODERATED NEUTRON SOURCES.
AD-292 073 DIV. 20

A PHOTOMULTIPLIER READOUT FOR THE BAUSCH AND LOMB 1.5 METER STIGMATIC SPECTROGRAPH.
AD-292 954 DIV. 24

***SPECTROPHOTOMETERS**

SPECTROPHOTOMETRIC STUDY OF THE LUNAR SURFACE.
AD-292 765 DIV. 2

COMPARISON OF MEASURED AND THEORETICAL VALUES OF THE SPECTRAL INTENSITY OF ULTRAVIOLET SKY RADIATION.
AD-292 911 DIV. 25

***SPECTROPHOTOMETERS**
PHOTOGRAPHIC RECORDING SYSTEMS

PROBLEMS OF PHOTOGRAPHIC SPECTROPHOTOMETRY OF SHORT DURATION LIGHT PULSES: GRANULARITY, RECIPROCITY FAILURE, AND LATENT IMAGE STABILITY.
AD-292 184 DIV. 24

***SPECTROPHOTOMETERS**
SUN

THE SPECTROHELIOGRAPH OF THE GORNAYA ASTRONOMICAL STATION OF THE MAIN ASTRONOMICAL OBSERVATORY OF THE ACADEMY OF SCIENCES OF THE USSR.
AD-292 613 DIV. 30

***SPEECH TRANSMISSION**
WAVE CHARACTERISTICS

APPLICATION OF COMPUTER TECHNIQUES TO DEVELOPMENT OF AUTOMATED SPEECH RECOGNITION SYSTEMS.
AD-293 449 DIV. 30

***SPHERES**

MECHANICAL PROPERTIES AND STRENGTH OF THICK-WALLED CYLINDRICAL AND HOLLOW SPHERICAL SHELLS EXPOSED TO IRRADIATION: NEUTRON BEAMS.
AD-292 218 DIV. 25

***SPHERES**
ELASTICITY

RADIAL VIBRATIONS OF GRAVITATING, ELASTIC SPHERE.
AD-293 470 DIV. 2

***STAINLESS STEEL**
BONDING

COMPARISON OF DEGRADATION OF ADHESIVE BONDS BY IR AND OVEN HEATING: ADHESIVE BONDING OF STAINLESS STEEL.
AD-291 912 DIV. 14

***STAINLESS STEEL**
STRESSES

EFFECTS OF SEVERAL CONVENTIONAL HEAT TREATMENTS ON STRESS CORROSION PROPERTIES OF 17-7 PH STAINLESS STEEL: SANDBLASTING AND SURFACE PASSIVATION: SALT SPRAY TESTS.
AD-293 098 DIV. 17

***STANDARDIZATION**

STANDARDIZATION STUDY OF COAXIAL SWITCHES.
AD-292 952 DIV. 8

***STANDARDS**

FLUX AND SPECTRAL MEASUREMENTS OF PRIMARY AND MODERATED NEUTRON SOURCES.
AD-292 073 DIV. 20

INTERNATIONAL SYSTEM OF UNITS OF MEASUREMENT OF PHYSICAL VALUES: THE BASIC UNITS APPEAR TO BE METER, KILOGRAM, SECOND, AMPERE, KELVIN DEGREE.
AD-292 650 DIV. 30

***STAPHYLOCOCCUS**

PURIFICATION STUDIES WERE MADE OF LEUCOZYMES OF GUINEA PIG LEUCOCYTES AND THE STUDIES OF THEIR NATURE WERE CONTINUED. THE COMPLETE SEPARATION OF LEUCOZYME FROM LYSOZYME WAS ACHIEVED AND THIS PREPARATION HAD NO EFFECT ON THE MUCOPEPTIDE. LEUCOZYME A BETA STOPS OXYGEN UPTAKE AND CAUSES CYTOPLASMIC DESTRUCTION OF NONPATHOGENIC STAPHYLOCOCCI. AVIRULENT AND VIRULENT CHARACTERISTICS WERE OBSERVED IN OTHER TEST ANIMALS WHICH WERE SUBJECTED TO INFECTIONS OF PNEUMOCOCCI, ESCHERICHIA COLI, SHIGELLA, AND SALMONELLA STRAINS. THE ATTACK POINT OF PLAKIN ON THE CHAIN OF RESPIRATORY SYSTEM OF B. MEGATERIUM WAS CLARIFIED. PHOSPHOLIPIDS OF CYTOPLASMIC MEMBRANE WERE THE MAIN ATTACK POINT OF PLAKIN AND IT WAS THE CAUSE OF THE DAMAGE OF THE ELECTRON TRANSFERRING SYSTEM.
AD-292 263 DIV. 16

***STARS**

STELLA SIMULATOR FEASIBILITY STUDY.
AD-292 669 DIV. 2

ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE. GLOBULAR STAR CLUSTERS. WOLF-RAYET STAR OF GAMMA 2 VELORUM. H/HE RATIO IN NO 9644A. EMISSION NEBULOSITIES IN SMALL AND LARGE MAGELLANIC CLOUDS. SPECTRUM OF NGC 7009.
AD-292 680 DIV. 2

***STATISTICAL ANALYSIS**

A COMPUTER-AUGMENTED TECHNIQUE FOR THE DESIGN OF LIKELIHOOD-RATIO RECEIVERS.
AD-292 161 DIV. 8

THE STUDY OF CORRELATED RANDOM VALUES.
AD-292 609 DIV. 15

SOME STATISTICAL PROBLEMS CONNECTED WITH STUCHASTIC PROCESSES.
AD-293 676 DIV. 15

THEORETICAL EXPLANATION OF OBSERVED DECREASING FAILURE RATE.
AD-293 692 DIV. 26

***STATISTICAL DISTRIBUTIONS**

FORTRAN PROGRAM TO ESTIMATE CUMULATIVE SURVIVAL PROBABILITY AND VARIANCE.
AD-293 155 DIV. 30

THEORETICAL EXPLANATION OF OBSERVED DECREASING FAILURE RATE.
AD-293 692 DIV. 26

***STATISTICAL DISTRIBUTIONS**
SAMPLING

THE UTILITY OF STATISTICS OF RANDOM NUMBERS.
AD-293 249 DIV. 15

***STATISTICAL FUNCTIONS**

THE STUDY OF CORRELATED RANDOM VALUES.
AD-292 609 DIV. 15

***STATISTICAL PROCESSES**

LIMITING DISTRIBUTION OF A MARKOV PROCESS WIT STATIONARY TRANSITION PROBABILITIES IS ALSO THE STATIONARY DISTRIBUTION IF THE PROCESS DECAYS EXPONENTIALLY BUT IS INCREMENTED AT POISSON TIME BY RANDOM AMOUNTS.
AD-292 063 DIV. 15

OUTLINES WORK PREVIOUSLY REPORTED AND DESCRIBES PLANS FOR FUTURE RESEARCH IN STATISTICAL THERMODYNAMICS.
AD-292 906 DIV. 9

***STATISTICAL TESTS**

SOME STATISTICAL PROBLEMS CONNECTED WITH STOCHASTIC PROCESSES.
AD-293 676 DIV. 15

***STEEL**
ALLOYS

EVALUATION OF PROPERTIES OF HIGH STRENGTH ALLOY STEELS FOR USE IN LARGE SOLID PROPELLANT ROCKET MOTOR CASES.
AD-292 258 DIV. 27

***STEEL**
CLEANING

EQUIPMENT FOR REMOVING SINTER FROM SURFACE OF STEEL HOT-ROLLED BAND (METAL TAPES) WITH ABRASIVE MATERIAL: METALLIC BATH WITH SPARK DISCHARGES.
AD-292 207 DIV. 26

***STEEL**
COATINGS

PERFORMANCE TESTS OF BONDS MADE WITH SCOTCH-WELD AF31 ADHESIVE ON CD-PLATED 4130 STEEL, TREATED WITH IRIDITE #8 CONVERSION COATING.
AD-292 393 DIV. 14

***STEEL**
ELECTROPLATING

HYDROGEN RELIEF OF NICKEL AND CHROMIUM ELECTROPLATED HOT-WORK DIE STEELS - VASCOJET 1000 (H-11).
AD-292 290 DIV. 17

***STEEL**
HEAT TREATMENT

MECHANICAL PROPERTIES AND PROCESSING SAE 4335 STEEL: HEAT TREATMENT: FATIGUE: TENSILE PROPERTIES.
AD-292 270 DIV. 17

***STEEL**
MACHINING

COLD-HARDENED LAYERS OF STEEL BY GRINDING: ELECTRIC SPARK WORKING OF HEAT-RESISTANT ALLOYS ON A NI BASE: ELECTRODES.
AD-292 225 DIV. 17

***STEEL**
MECHANICAL PROPERTIES

DYNAMIC AND STATIC STRENGTH OF HARDENED STEEL FROM A 500 C1 TO A SUB CT TEMPERATURES: DEFORMATION: PLASTICITY: ELASTICITY: CRYSTALLIZATION: MECHANICAL PROPERTIES: PHASE DIAGRAMS.
AD-292 239 DIV. 17

DEPENDENCE OF MECHANICAL PROPERTIES OF EUTECTOID STEEL ON THE STRUCTURAL STATE OF PEARLITE: MICROSTRUCTURE: HARDNESS: TENSILE STRENGTH: GRAIN GROWTH.
AD-292 603 DIV. 17

SURVEY OF NOTCH-TOUGHNESS PROPERTIES OF SHIP PLATES: FRACTURE MECHANICS: SPECIFICATIONS: TENSILE TESTS: CHARPY V-NOTCH TESTS: COMPOSITION ANALYSIS.
AD-292 700 DIV. 17

FRACTURE CHARACTERISTICS OF SEVERAL MARAGING STEELS: DETERMINATION OF PLANE STRAIN FRACTURE TOUGHNESS VALUES.
AD-292 902 DIV. 17

***STEEL**
RIVETS

ULTIMATE SHEAR STRENGTH: DRIVING CHARACTERISTICS: AND CORROSIVE EFFECTS OF VASCOJET 1000 STEEL RIVETS IN ALUMINUM ALLOY SHEET.
AD-292 295 DIV. 26

***STORAGE BATTERIES**

LOW TEMPERATURE RA-2270/U-ALT-1 BATTERIES: IN-PLANT AND SIGNAL CORPS TESTING OF 900 BATTERIES: DISCHARGE AND ELECTROLYTE LEAKAGE TESTS: PERFORMANCE UP TO AND INCLUDING 24 MONTHS DELAY.
AD-293 425 DIV. 7

***STORAGE TUBES**

METHOD OF CONSTRUCTING A LINEAR FERRITE MEMORY DEVICE AND A DEVICE IMPLEMENTING THE METHOD.
AD-292 206 DIV. 30

***STORAGE TUBES**
DISPLAY SYSTEMS

INTERFERENCE BLANKER AN/SPX-27 WHICH USES STORAGE TUBES TO ELIMINATE NONSYNCHRONOUS SIGNALS FROM RADAR BEACON VIDEO REPLIES.
AD-292 113 DIV. 6

***STORMS**

RADIOGONIOMETRIC INVESTIGATIONS OF THUNDERSTORMS AND CLOUDS OF GREAT ELECTRICAL ACTIVITY.
AD-292 643 DIV. 2

*STORMS
GEORGIA

AN OBJECTIVE METHOD FOR FORECASTING AIR MASS THUNDERSTORMS AT ROBINS AF BASE, GEORGIA.
AD-293 604 DIV. 2

*STRAIN GAGES

CONSTRUCTION OF A SMALL HG STRAIN GAGE FOR MEASURING CHANGES IN CARDIAC DIMENSIONS; PLETHYSMOGRAPHY OF THE HUMAN FINGER.
AD-293 132 DIV. 16

*STRAINERS

DESIGN AND DEVELOPMENT OF REGENERATIVE CO2 SORBERS; MOLECULAR SIEVES AND AGZO SORPTION SYSTEMS; THEORETICAL CONSIDERATIONS OF MASS TRANSFER.
AD-293 226 DIV. 26

*STRATOSPHERE

TRANSFER THROUGH THE TROPOPAUSE AND WITHIN THE STRATOSPHERE.
AD-292 090 DIV. 2

DIRECT MEASUREMENT OF THE MERIDIONAL CIRCULATION IN THE STRATOSPHERE DURING THE IGY.
AD-292 149 DIV. 2

*STRATUS CLOUDS

AN OBJECTIVE METHOD FOR FORECASTING CEILING RSTRICTIONS DUE TO GULF STRATUS AT TINKER AF BASE, OKLAHOMA.
AD-293 603 DIV. 2

*STRESS (PHYSIOLOGY)
THERMAL RADIATION

THE RESULTS OF A PRELIMINARY STUDY INTENDED TO ANALYZE THE EFFECTS OF THE SUDDEN APPLICATION OF A HEAT SOURCE ON ONE SIDE OF A PLANE OR CYLINDRICAL WALL IS PRESENTED. EXPERIMENTAL INFORMATION FOR A RELIABLE ANALYSIS OF THE EFFECTS OF THE THERMAL SHOCK.
AD-292 265 DIV. 25

*STRESSES

SYMPOSIUM ON EQUATION OF STATE FOR EARTH MATERIALS. ABSTRACTS OF THE PAPERS ARE PRESENTED. IN THIS TEXT EQUATION OF STATE MEANS BEHAVIOR OF A MATERIAL UNDER GIVEN STATES AND BOUNDARY CONDITIONS REGARDLESS OF INTENSITY OF THE APPLIED STRESS.
AD-292 629 DIV. 13

STRESS POTENTIALS. PATH DENSITIES. RELATIVISTIC THERMODYNAMICS.
AD-293 440 DIV. 25

*STRESSES
HEAT

TENSILE AND COMPRESSION STRENGTHS OF ALUMINUM ALLOY SHEETS AFTER SHORT PERIODS AT ELEVATED TEMPERATURES - 300-900 F FOR TWO MINUTES.
AD-292 259 DIV. 17

*STRESSES
MATHEMATICAL ANALYSIS

NONLINEAR THEORY OF ELASTIC SHELLS UNDR THE KIRCHHOFF HYPOTHESIS; DETERMINATION OF SUITABLE STRAIN MEASURES AND THE DERIVATION OF CONSTITUTIVE EQUATIONS.
AD-292 978 DIV. 25

*STRONTIUM COMPOUNDS

FAILURE MECHANISMS IN FERROELECTRIC AND NONLINEAR DIELECTRICS; ELECTROMECHANICAL AND BREAKDOWN MEASUREMENTS; HIGH VOLTAGE PULSE GENERATOR; OXYGEN DIFFUSION; ELECTROSTRICTIVE AND ELASTIC CONSTANTS.
AD-293 266 DIV. 25

*STRUCTURAL SHELLS

ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
AD-292 118 DIV. 25

*STRUCTURES

SYMPOSIUM ON EQUATION OF STATE FOR EARTH MATERIALS. ABSTRACTS OF THE PAPERS ARE PRESENTED. IN THIS TEXT EQUATION OF STATE MEANS BEHAVIOR OF A MATERIAL UNDER GIVEN STATES AND BOUNDARY CONDITIONS REGARDLESS OF INTENSITY OF THE APPLIED STRESS.
AD-292 629 DIV. 13

*STRUCTURES
MATHEMATICAL ANALYSIS

ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
AD-292 118 DIV. 25

*SUBMARINES
FUEL CELLS

DESIGN STUDY FOR HYDROGEN GENERATION PLANT FOR SUBMARINE FUEL CELLS BASED ON AMMONIA DECOMPOSITION.
AD-292 139 DIV. 7

*SULFATES

RADIOACTIVE ISOTOPE DILUTION METHOD DETERMINATION SULFATE CONCENTRATION IN CR PLATING SOLUTIONS; PRECIPITATION.
AD-292 281 DIV. 20

*SULFUR COMPOUNDS

RADIOPROTECTIVE DRUGS. SYNTHESIS OF AMINO-1+2-DITHIACYCLANES. REARRANGEMENTS OF NITROGEN MUSTARD-LIKE INTERMEDIATES WERE OVERCOME BY BLOCKING THE NITROGEN WITH THE BENZENESULFONYL GROUP AND LATER REMOVING IT BY REDUCTION WITH NA IN LIQUID NH3.
AD-292 908 DIV. 10

*SUN
RADAR REFLECTIONS

THE EL CAMPO SOLAR RADAR ANTENNA.
AD-292 173 DIV. 8

*SUPERHIGH FREQUENCY
MICROWAVES

TEMPERATURE RISE CURVES AT VARIOUS DEPTHS OF TISSUE. TISSUE PATHOLOGY; PARTICULARLY IN THE MOUSE REPRODUCTIVE SYSTEM; PRODUCED BY 3-CM ELECTROMAGNETIC WAVES.
AD-292 205 DIV. 16

*SUPERSONIC FLOW

HEAT TRANSFER ON THE SURFACE OF A BODY BEING MELTED IN A SUPERSONIC STREAM WITH MOLTEN METAL FED THROUGH POROUS WALL SURFACE; EFFECT OF LIQUID FILM.
AD-292 236 DIV. 25

*SURFACES

EQUIPMENT FOR REMOVING SINTER FROM SURFACE OF STEEL HOT-ROLLED BAND (METAL TAPES) WITH ABRASIVE MATERIAL; METALLIC BATH WITH SPARK DISCHARGES.
AD-292 207 DIV. 26

METHOD AND EQUIPMENT FOR FINISHING METAL SURFACES BY VIBRO-ARC SURFACING.
AD-292 233 DIV. 26

TABULATION OF AREAS OCCUPIED BY 5 PERCENT ALBEDO CLASSES PER 5 DEGREE LATITUDE BELT.
AD-292 243 DIV. 2

*SURGERY
BLOOD VESSELS

EXPERIMENTAL SURGERY WAS PERFORMED ON DOGS TO UNITE A COMPLETELY AMPUTATED LEG AFTER ARTIFICIAL PERFUSION. HISTOLOGICAL CHANGES IN MUSCLE FIBERS DEVELOPED TWO HOURS AFTER AMPUTATION. OXYGEN CONSUMPTION WAS KEPT AT NEARLY CONTROL LEVEL IN LEGS WITHOUT CIRCULATION FOR FOUR HOURS.
AD-292 267 DIV. 16

*SURVIVAL

FORTRAN PROGRAM TO ESTIMATE CUMULATIVE SURVIVAL PROBABILITY AND VARIANCE.
AD-293 155 DIV. 30

*SURVIVAL KITS

SURVIVAL KIT FOR PASSENGERS, WHICH COULD BE ATTACHED TO A STANDARD BACK-TYPE PARACHUTE. ESSENTIAL ITEMS OF EQUIPMENT NEEDED TO SURVIVE IN ARCTIC REGIONS FOLLOWING AN EMERGENCY BAILOUT.
AD-293 171 DIV. 29

*SWEAT COOLING

A TRANSPIRATION-COOLED WALL STABILIZED D-C ARC.
AD-292 337 DIV. 9

*SWITCHING CIRCUITS

A LUMPED PARAMETER (TRANSISTORS, RESISTORS, DIODES AND LAMPS) MODEL OF A SOLID STATE SWITCHING CIRCUIT FOR ELECTRO-LUMINESCENT DISPLAYS.
AD-292 089 DIV. 5

REALIZABILITY CONDITIONS OF SINGLE-CONTACT NETWORKS.
AD-293 103 DIV. 8

OPTIMAL MODE SWITCHING IN TRANSFER TRAJECTORIES.
AD-293 152 DIV. 12

*SYMPOSIA
CLOSED-CYCLE ECOLOGICAL SYSTEMS

PAPERS PRESENTED AT A SYMPOSIUM ON BIOLOGISTICS FOR SPACE SYSTEMS.
AD-292 713 DIV. 16

*SYMPOSIA
PROPULSION

CONTROLLED FUSION PROPULSION FOR SPACE APPLICATIONS - SYMPOSIA PAPER.
AD-293 695 DIV. 12

*TABLES

PROPELLANT PERFORMANCE AND GAS COMPOSITION HANDBOOK. PERFORMANCE TABLES OBTAINED BY PLOTTING DATA FROM MACHINE CALCULATIONS AND INTERPOLATING TO OBTAIN VACUUM SPECIFIC IMPULSES FOR INTEGRAL VALUES OF THE AREA RATIO. TABLES OF GAS COMPOSITIONS AND PERFORMANCES.
AD-293 603 DIV. 10

THE CIRCULAR COVERAGE FUNCTION; AN ASPECT OF GAUSSIAN DISTRIBUTION.
AD-293 675 DIV. 15

*TANTALUM ALLOYS
MECHANICAL PROPERTIES

PILOT PRODUCTION OF TANTALUM ALLOY SHEET.
AD-292 082 DIV. 17

*TARGET POSITION INDICATORS
CONTROL SYSTEMS

MULTIPLE AIRBORNE TARGET TRAJECTORY SYSTEM (MATTS) EVALUATION STUDY.
AD-292 150 DIV. 8

*TARGET RECOGNITION

THE OPERATION AND DESIGN OF THE GPA-66 IS DESCRIBED.
AD-292 142 DIV. 6

*TAYLOR'S SERIES

ASYMPTOTIC POWER SERIES EXPANSION OF INTEGRALS INVOLVING LARGE PARAMETERS AND SEPARATION OF ALL SINGULARITIES FROM THE SADDLE POINT.
AD-292 997 DIV. 13

*TAYLOR'S SERIES
INTEGRALS

ASYMPTOTIC POWER SERIES EXPANSIONS OF INTEGRALS INVOLVING A LARGE PARAMETER; ONE SINGULARITY CLOSE TO THE SADDLE POINT.
AD-292 916 DIV. 13

*TEACHING MACHINES

USE OF COMPUTERS AS TEACHING MACHINES IN A CLASSROOM SITUATION.
AD-293 243 DIV. 30

*TELEMETER SYSTEMS

REMOTE MONITORING AND CONTROL APPARATUS FOR LARGE DISPERSED SYSTEMS.
AD-292 195 DIV. 5

INVESTIGATION OF HIGH FREQUENCY PROPAGATION IN THE IONOSPHERE USING SATELLITE TRANSMISSIONS.
AD-293 630 DIV. 8

*TELEMETERING

REMOTE MONITORING AND CONTROL APPARATUS FOR LARGE DISPERSED SYSTEMS.
AD-292 195 DIV. 5

*TELEPHONE COMMUNICATION SYSTEMS

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES, INTERCONTINENTAL AREAS AND THE SUPPORT REGIONS.
AD-291 999 DIV. 5

*TELESCOPES

A ONE METRE MIRROR FOR MOON TRACKING AND PHOTOGRAPHY.
AD-292 741 DIV. 2

*TELETYPE SYSTEMS

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES; INTERCONTINENTAL AREAS AND THE SUPPORT REGIONS.
AD-291 999 DIV. 5

*TELEVISION CAMERAS

AEROSOL FLASH CAMERA AND ELECTROCHEMICAL DETECTOR FOR DETECTION AND ANALYSIS OF VX PARTICLE SIZE. MAIN COMPONENTS OF THE AEROSOL CAMERA ARE; FLASH ILLUMINATOR; OBJECTIVE LENS; IMAGE INTENSIFIER TUBE AND TV CAMERA.
AD-293 269 DIV. 3

•TELEVISION EQUIPMENT

RESTORATION OF QUENCHING AND SYNCHRONIZING PULSES IN THE VIDEO SIGNAL AFTER MAGNETIC RECORDING.
AD-292 231 DIV. 8

•TEMPERATURE
HEAT RESISTANT ALLOYS

RESULTS OF A FLIGHT TO MEASURE THE RADIANT TEMPERATURE OF THE SKY AT HIGH ALTITUDE.
AD-293 195 DIV. 2

•TENSILE PROPERTIES

EVALUATION OF VANADIUM ALLOYS.
AD-292 244 DIV. 17

•TENSILE PROPERTIES
ALUMINUM ALLOYS

TENSILE AND COMPRESSION STRENGTHS OF ALUMINUM ALLOY SHEETS AFTER SHORT PERIODS AT ELEVATED TEMPERATURES - 300-900 F FOR TWO MINUTES.
AD-292 259 DIV. 17

•TENSOR ANALYSIS

EVALUATION OF MATRIX ELEMENTS IN CRYSTALLINE FIELD THEORY.
AD-292 081 DIV. 25

THE THEORY OF NEWTONIAN GRAVITATION; TENSORS OF HIGHER RANK; THE SUPER-POTENTIALS OF HOMOGENEOUS ELLIPSOIDS AND THE POINT OF BIFURCATION ALONG THE SEQUENCE OF THE JACOBI ELLIPSOIDS ARE STUDIED.
AD-292 254 DIV. 2

•TENTS

DEVELOPMENT OF TENT LINERS FOR ACHIEVING HEATING REQUIREMENTS FOR TENTS.
AD-292 050 DIV. 14

•TERRESTRIAL MAGNETISM

THE TRANSMISSION OF AUDIO-FREQUENCY ELECTROMAGNETIC WAVES THROUGH THE TERRESTRIAL IONOSPHERE IN THE MAGNETO-IONIC MODE.
AD-292 716 DIV. 25

THE DIFFUSION OPERATOR IS DERIVED FOR MOTION OF ELECTRONS ALONG THE LINES OF FORCE OF A DIPOLE APPROXIMATION TO THE GEOMAGNETIC FIELD.
AD-292 738 DIV. 25

•TEST FACILITIES
RADAR REFLECTIONS

TECHNIQUES FOR MEASUREMENT OF LOW RADAR CROSS SECTIONS OF PHYSICALLY LARGE OBJECTS.
AD-292 955 DIV. 30

•TEST METHODS
ELECTRIC PRIMERS

DC AND RF MEASUREMENTS ARE USED TO EVALUATE HOT-WIRE-BRIDGED, ELECTRO-EXPLOSIVE DEVICES.
AD-292 075 DIV. 8

•TEST SETS

FEASIBILITY OF PROVIDING FIELD INSTRUMENTATION CAPABLE OF SHOWING THE RATE OF DEGRADATION OF PERFORMANCE OF AN INDIVIDUAL ELECTRONIC EQUIPMENT EXPRESSED IN TERMS OF OPERATING TIME REMAINING UNTIL FAILURE OCCURS.
AD-292 141 DIV. 8

•TEST SETS
GROUND SUPPORT EQUIPMENT

MISTRAM AUXILIARY CHECKOUT KIT TO TEST A MISSILE TRANSPONDER BEFORE LAUNCH TO VERIFY NECESSARY X-BAND MISTRAM OPERATION.
AD-293 208 DIV. 30

•TEST SETS
MICROWAVE EQUIPMENT

RADAR TEST SET AN/APM-123I RADAR SET TS-1314.
AD-292 048 DIV. 6

•TEXTBOOKS

A COMPILATION OF HANDBOOKS CATALOGED BY ASTIA FROM 1952 THROUGH 1962.
AD-292 750 DIV. 32

•TEXTILES
TEST METHODS

A SURVEY OF 18-OUNCE BLENDED SERGE FABRICS, WEAR RESISTANCE.
AD-292 903 DIV. 29

•THEORY

A REVIEW OF SOME APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING.
AD-293 679 DIV. 15

•THERMAL CONDUCTIVITY

THERMAL CONDUCTIVITY OF MOLDED AND PYROLYTIC GRAPHITES; ANISOTROPIC SOLIDS; HIGH TEMPERATURE RESEARCH; TEST METHODS.
AD-292 326 DIV. 14

•THERMAL INSULATION
ELASTOMERS

SEMI-INORGANIC ELASTOMERS - STANNOSILOXANE, TITANOSILOXANES, ALUMINOSILOXANES, ARSENOSILOXANES, STANNOSILOXANE-BASED COMPOSITIONS APPEARED SUPERIOR TO SILICONE-BASED COMPOSITIONS IN INSULATIVE CAPABILITY BUT INFERIOR TO NITRILE RUBBER-PHENOLIC RESINS AS ABLATIVE INSULATORS.
AD-293 422 DIV. 27

•THERMAL STRESSES
DETERMINATION

TEMPERATURE FIELD AND THERMAL STRESSES OF TURBINE DISKS.
AD-292 210 DIV. 27

•THERMIONIC EMISSION

A CAVITY GENERATOR, USING CESIUM VAPOR, IS USED AS A SOLAR THERMIONIC GENERATOR.
AD-292 143 DIV. 7

FEASIBILITY OF A NUCLEAR SPACE POWER SYSTEM THAT UTILIZES A THERMIONIC RADIATION; AN ELECTRICALLY HEATED REFRACTORY METAL (CB-ZR) TEST LOOP; REFRACTORY METAL PROPERTIES; LIQUID LITHIUM.
AD-293 493 DIV. 7

•THERMOCOUPLES
TRANSPORT PROPERTIES

DEVELOPS THEORY OF TRANSPORT PHENOMENA AS APPLIED TO THERMOCOUPLES, USING THE BOLTZMANN TRANSPORT EQUATION.
AD-293 411 DIV. 25

•THERMODYNAMICS

A THEORY FOR OBTAINING THE LOW ORDER DISTRIBUTION FUNCTIONS AND THE THERMODYNAMIC PARAMETERS FOR NONUNIFORM EQUILIBRIUM SYSTEMS.
AD-292 937 DIV. 9

STRESS POTENTIALS. PATH DENSITIES. RELATIVISTIC THERMODYNAMICS.
AD-293 440 DIV. 25

•THERMODYNAMICS
ANALYSIS

ANALYSIS OF ENERGY LOSSES IN AN MHD GENERATOR
AD-292 187 DIV. 8

•THERMODYNAMICS
THEORY

OUTLINES WORK PREVIOUSLY REPORTED AND DESCRIBES PLANS FOR FUTURE RESEARCH IN STATISTICAL THERMODYNAMICS.
AD-292 906 DIV. 9

•THESES

A STUDY OF HIGH-LOW JUNCTIONS AND HIGH-LOW JUNCTION SEMICONDUCTOR DEVICES.
AD-291 922 DIV. 25

•THIN FILMS

HIGH GAIN TRANSMISSION SECONDARY EMISSION FILMS; IMPROVEMENT OF LOW DENSITY KCL DYNODES; EVAPORATION TECHNIQUES AND STRUCTURAL STUDIES.
AD-292 709L DIV. 8

HALL EFFECT INVESTIGATIONS; GALVANOMAGNETIC MEASUREMENTS ON EVAPORATED THIN FILMS OF INSB ON GLASS SUBSTRATES; MAGNETORESTRICTIVE CONTRIBUTION OF INSB FILMS.
AD-293 433 DIV. 27

•THUNDERCLOUDS

RADIOGONIOMETRIC INVESTIGATIONS OF THUNDERSTORMS AND CLOUDS OF GREAT ELECTRICAL ACTIVITY.
AD-292 683 DIV. 2

•TICKS
ENCEPHALITIS VIRUSES

AN EXPERIMENTAL INVESTIGATION OF DERMACENTOR SILVARUM TICKS AS CARRIERS OF VERNAL ENCEPHALITIS VIRUS IS PRESENTED.
AD-293 481 DIV. 16

•TIME INTERVAL COUNTERS

EVALUATION TESTS OF ELAPSED TIME INDICATORS AND DEVELOPMENT OF AN APPLICABLE SPECIFICATION.
AD-292 932 DIV. 7

•TIME INTERVAL COUNTERS
ELECTRONIC EQUIPMENT

DEVELOPMENT OF A TEMPERATURE STABILIZED ORDNANCE BINARY TIMER. ELECTRONIC CIRCUITS.
AD-292 923 DIV. 22

•TIN COMPOUNDS

HIGH-TEMPERATURE VAPOR DEPOSITION GROWTH OF SINGLE CRYSTALS OF SN (IV) AND CO OXIDES.
AD-292 114 DIV. 25

•TIRES

TESTS ON TWO FORKLIFT TRUCKS USING 2 DIFFERENT TYPES OF TIRES.
AD-292 996 DIV. 11

•TITANATES

FAILURE MECHANISMS IN FERROELECTRIC AND NONLINEAR DIELECTRICS; ELECTROMECHANICAL AND BREAKDOWN MEASUREMENTS; HIGH VOLTAGE PULSE GENERATOR; OXYGEN DIFFUSION; ELECTROSTRICTIVE AND ELASTIC CONSTANTS.
AD-293 266 DIV. 25

•TITANIUM

EFFECTS OF ADSORBED FILMS OF CAMPHOR AND THYMOL ON KINETICS OF THE TI(IV)-TI(III) ELECTRODE REACTION.
AD-293 463 DIV. 6

•TITANIUM
PRODUCTION

SYNTHESIS OF METALLIC TI FROM ITS OXIDES AND CHLORIDES; VACUUM APPARATUS; HIGH FREQUENCY ELECTRIC CHARGES; CONTINUOUS PROCESS.
AD-292 683 DIV. 17

•TITANIUM ALLOYS
EXTRUSION

EXTRUSION AND DRAWING OF TITANIUM ALLOYS.
AD-292 340 DIV. 17

•TITANIUM ALLOYS
GRAINS (METALLURGY)

INHIBITION OF BETA GRAIN GROWTH IN TITANIUM ALLOYS BY ADDITION OF VARIOUS ELEMENTS; BORON, SULFUR, SILVER, HAFNIUM, BARIUM, OR STRONTIUM.
AD-292 703 DIV. 17

•TITANIUM ALLOYS
MECHANICAL PROPERTIES

EFFECT OF HEAT TREATING VARIABLES AND ELEVATED TEMPERATURES ON MECHANICAL PROPERTIES OF HIGH OXYGEN CONTENT 6AL-4V TITANIUM ALLOY STRESS STABILITY TESTS.
AD-292 280 DIV. 17

•TITANIUM ALLOYS
RIVETS

STRENGTH AND DRIVING CHARACTERISTICS OF COLD-HEADED B-120-VCA TI ALLOY RIVETS FASTENED INTO THIN STEEL STRIPS.
AD-293 099 DIV. 20

•TOOL STEEL
COATINGS

WEATHER EXPOSURE DATA FOR HIGH-TEMPERATURE COATINGS ON CHROMIUM HOT-WORK TOOL STEELS. A NICKEL-ZINC COATING WAS MOST EFFECTIVE FOR PROTECTION FROM CORROSION. PRE-EXPOSURE FROM 500 TO 1000 F FOR 150 HR.
AD-293 219 DIV. 14

•TOPOLOGY

A COMPLETE MEASURE SPACE HAS THE LIFTING PROPERTY IF AND ONLY IF THE WHOLE SPACE IS A DIRECT SUM OF SUMMABLE SUBSETS PLUS PERHAPS A LOCALLY NULL SET.
AD-292 753 DIV. 15

REPORT ON RESEARCH DONE UNDER GRANT ON PSEUDO-CONCAVE AND -CONVEX COMPLEX SPACES; INCLUDES BIBLIOGRAPHY AND PERSONNEL INVOLVED.
AD-292 904 DIV. 15

EXTENSION OF THEOREM THAT THE MEASURE ON THE COUNTABLE DIRECT PRODUCT OF REAL LINES WITH IDENTICAL GAUSSIAN MEASURES TRANSFORMS TO AN EQUIVALENT MEASURE UNDER A LINEAR TRANSFORMATION WITH A HILBERT-SCHMIDT OPERATOR.
AD-292 919 DIV. 19

REALIZABILITY CONDITIONS OF SINGLE-CONTACT NETWORKS.
AD-293 103 DIV. 8

•TORPEDOES

FREE-SURFACE WATER-TUNNEL TESTS OF AN UNCAMBERED BASE-VENTED PARABOLIC HYDROFOIL OF ASPECT RATIO ONE.
AD-292 308 DIV. 9

•TOXICITY

AIR DISPERSION OF TOXIC ROCKET EXHAUST.
AD-293 432 DIV. 25

•TRACER STUDIES

RHODIUM-102 HIGH ALTITUDE TRACER EXPERIMENT. A NUCLEAR EXPLOSION OVER JOHNSTON ISLAND.
AD-291 927 DIV. 20

•TRACKING
HUMAN ENGINEERING

VARIABLES AFFECTING PERFORMANCE ON VIGILANCE TASK AND LEVEL OF ALERTNESS ON TRACKING.
AD-291 951 DIV. 28

•TRAINING DEVICES
MEMORY

DESIGN OF A PAIRED ASSOCIATES TRAINER FOR TRAINING RESEARCH.
AD-292 705 DIV. 23

•TRANSFORMATIONS (MATHEMATICS)

EXTENSION OF THEOREM THAT THE MEASURE ON THE COUNTABLE DIRECT PRODUCT OF REAL LINES WITH IDENTICAL GAUSSIAN MEASURES TRANSFORMS TO AN EQUIVALENT MEASURE UNDER A LINEAR TRANSFORMATION WITH A HILBERT-SCHMIDT OPERATOR.
AD-292 918 DIV. 15

ASYMPTOTIC POWER SERIES EXPANSION OF INTEGRALS INVOLVING LARGE PARAMETERS AND SEPARATION OF ALL SINGULARITIES FROM THE SADDLE POINT.
AD-292 997 DIV. 15

TRANSPORTATION OF EARTH CO-ORDINATES IN RADAR DATA INPUT SYSTEMS.
AD-293 242 DIV. 15

DERIVATION OF AN INTEGRAL INVERSION FORMULA FOR AN INTEGRAL TRANSFORMATION WHICH CONTAINS THE GEGENBAUER POLYNOMIAL IN THE KERNEL.
AD-293 456 DIV. 15

•TRANSFORMATIONS (MATHEMATICS)
ALGEBRA

STUDY OF A CONSERVATIVE ALGEBRAIC TRANSFORMATION SYMMETRIC WITH RESPECT TO AN INVOLUTION.
AD-292 670 DIV. 15

CLASSIFICATION OF FIXED POINTS OF SOME ALGEBRAIC TRANSFORMATIONS WITH APPLICATION.
AD-292 671 DIV. 15

•TRANSISTORS

A LOW NOISE, LOW DISTORTION TRANSISTOR, PLANAR PASSIVATED EPITAXIAL SILICON DEVICES BOTH NPN AND PNP.
AD-292 346 DIV. 8

TRANSISTOR RC NETWORK SYNTHESIS.
AD-293 480 DIV. 8

•TRANSISTORS
RELIABILITY

PRODUCTION ENGINEERING MEASURE TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL TRANSISTOR WITH A MAXIMUM OPERATING FAILURE RATE OF 0.001% PER 1000 HOURS AT A 90% CONFIDENCE LEVEL AT 25 C.
AD-292 071 DIV. 8

ENGINEERING PRODUCTION MEASURE TO INCREASE TRANSISTOR RELIABILITY TO A MAXIMUM OPERATING FAILURE RATE OF 0.01% AND 0.001% PER 1000 HOURS AT 90% CONFIDENCE LEVEL.
AD-293 271 DIV. 8

•TRANSMISSION LINES

TWO-CONDUCTOR LOW-PASS TRANSMISSION LINE WHICH ALLOWS A DESIRED AUDIO CONTROL SIGNAL TO BE DELIVERED TO AN ELECTROEXPLOSIVE DEVICE.
AD-292 110 DIV. 22

•TRANSMISSIONS
ARMORED VEHICLES

EVALUATION OF TX-100 TRANSMISSION MOUNTED IN THE M-113E1 (M113E2) ARMORED, FULL TRACKED, PERSONNEL CARRIER.
AD-291 974 DIV. 22

•TRANSMITTER RECEIVERS

ILLUSTRATIONS OF USER TEST MODELS OF THE AN/GRC-106 RADIO SET.
AD-293 416 DIV. 5

•TRANSPLANTATION
POPULATION

THE ROLE OF TRANSPORTATION IN RELATION TO ECONOMIC DEVELOPMENT IN THE UNITED STATES.
AD-293 134 DIV. 33

•TRANSPLANTATION
TISSUES (BIOLOGY)

THE CAPACITY OF INTRAVENOUSLY INJECTED CELLS FROM PERITONEAL FLUID, PERIPHERAL BLOOD, LYMPH NODES, THYMUS AND BONE MARROW TO RESTORE HEMATOPOIESIS IN LETHALLY X-IRRADIATED MICE.
AD-292 074 DIV. 16

•TRANSPORT PLANES

HEAVY PARTICLE INTERACTIONS.
AD-292 078 DIV. 20

•TRANSPORT PROPERTIES

SQUID PROJECT REPORT.
AD-292 674 DIV. 9

THE AVERAGE HORIZONTAL WIND DRIVEN MASS TRANSPORT OF THE ATLANTIC FOR FEBRUARY AS OBTAINED BY NUMERICAL METHODS.
AD-293 427 DIV. 2

•TRAUMATIC SHOCK
THERAPY

SHELF-STORED, POOLED HUMAN PLASMA (6 MO. AT ROOM TEMPERATURE) AND RECONSTITUTED LYOPHILIZED HUMAN PLASMA ARE MORE EFFECTIVE IN THE THERAPY OF RAT TOURNIQUET TRAUMA SHOCK THAN AGED OR FROZEN RAT PLASMA, FRESHLY COLLECTED RAT OR HUMAN PLASMA, AND HUMAN ALBUMIN. A FILTER SYSTEM FOR STERILIZATION OF PLASMA IS DESCRIBED.
AD-291 949 DIV. 16

•TRAVELING WAVE TUBES

A TWO-HELIX FORWARD WAVE AMPLIFIER-OSCILLATOR-MIXER-AMPLIFIER CAPABLE OF OPERATION FROM 50 TO 80 GC.
AD-292 139 DIV. 8

A LOW-NOISE E-BAND AMPLIFIER WITH AN ELECTRICALLY-TUNABLE BANDPASS FILTER EMPLOYING YIG SPHERES.
AD-292 794 DIV. 8

THE ELECTRICAL PROPERTIES OF RING-PLANE CIRCUITS FOR USE WITH HIGH-PERVEANCE BEAMS IN TRAVELING WAVE TUBES CAPABLE OF OPERATION ABOVE 35 KMC.
AD-293 094 DIV. 8

•TUNED AMPLIFIERS

FIXED TUNED BROADBAND, 4000 TO 6000 MC, LOW NOISE PARAMETRIC AMPLIFIER, AND AN ELECTRONICALLY TUNABLE AMPLIFIER FROM 4000 TO 6000 MC.
AD-293 478 DIV. 8

•TUNGSTEN

TRANSFER THROUGH THE TROPOPAUSE AND WITHIN THE STRATOSPHERE.
AD-293 090 DIV. 2

•TUNGSTEN
HEAT TREATMENT

EFFECT OF PROCESS ANNEALING ON THE STRUCTURE AND PROPERTIES OF CAST W1 MICROSTRUCTURE; MECHANICAL PROPERTIES; BRITTLENESS.
AD-292 617 DIV. 17

•TUNGSTEN
POWDERS

PREPARATION OF FINE W POWDER BY REDUCTION WITH ZN, BY ELECTROLYSIS, AND CYANIDE-REDUCTION.
AD-292 029 DIV. 17

•TUNGSTEN
THERMIONIC EMISSION

MANUFACTURING PROCESSES INVOLVED IN PRODUCTION OF POROUS TUNGSTEN EMITTERS FOR USE IN AN ATMOSPHERE OF CESIUM IN DEVELOPMENT OF ELECTRIC POPULSION SYSTEM.
AD-292 257 DIV. 27

•TUNGSTEN ALLOYS
MANUFACTURING METHODS

EVALUATION OF PROCESSING METHODS ON MICROSTRUCTURE AND PROPERTIES OF MOLYBDENUM AND TUNGSTEN ALLOYS CONTAINING VARYING PROPORTIONS OF BORON, HAFNIUM, NIOBIUM, TITANIUM AND ZIRCONIUM.
AD-292 250 DIV. 17

•TURBINES

TEMPERATURE FIELD AND GRADIENTS IN HEATED DISK TYPE TURBINE ROTOR UNDER STARTING CONDITIONS; HEAT TRANSFER COEFFICIENTS.
AD-292 206 DIV. 27

•TURBOSUPERCHARGERS

STUDY OF A CONSERVATIVE ALGEBRAIC TRANSFORMATION SYMMETRIC WITH RESPECT TO AN INVOLUTION.
AD-292 670 DIV. 15

•TURBULENT FLOW

THE TURBULENT BOUNDARY LAYER OF A GAS ON A PERMEABLE WALL.
AD-292 189 DIV. 9

•ULTRAVIOLET RADIATION
MEASUREMENT

COMPARISON OF MEASURED AND THEORETICAL VALUES OF THE SPECTRAL INTENSITY OF ULTRAVIOLET SKY RADIATION.
AD-292 911 DIV. 25

•ULTRAVIOLET SPECTROSCOPY

SHOCK TUBE SPECTROSCOPY IN THE UV REGION; IO2 BAND SYSTEM; BAND HEADS OF TINI BA ABSORPTION SPECTRUM.
AD-292 266 DIV. 25

•UNDERGROUND STRUCTURES

SYMPOSIUM ON EQUATION OF STATE FOR EARTH MATERIALS. ABSTRACTS OF THE PAPERS ARE PRESENTED. IN THIS TEXT EQUATION OF STATE MEANS BEHAVIOR OF A MATERIAL UNDER GIVEN STATES AND BOUNDARY CONDITIONS REGARDLESS OF INTENSITY OF THE APPLIED STRESS.
AD-292 629 DIV. 13

AN ECONOMICAL, ARCH-SHAPED SHELTER, UTILIZING PNEUMATICALLY-PLACED MORTAR, PROVIDES PROTECTION FOR 100 MEN AND AN OVERPRESSURE OF 100 PSI.
AD-292 930 DIV. 13

•UNDERWATER COMMUNICATION SYSTEMS
SONAR EQUIPMENT

UNDERWATER COMMUNICATIONS SET AN/UQC-1(XG-1).
AD-291 990 DIV. "

•UNDERWATER EXPLOSIONS

TESTS TO OBTAIN VEGETATION REFLECTANCE DATA FROM 250 TO 2000 MILIMICRONS IN ORDER TO DETERMINE THE EFFECT OF UNDERGROUND NUCLEAR EXPLOSIONS ON VEGETATION.
AD-292 994 DIV. 20

MIGRATION OF EXPLOSION BUBBLES IN A ROTATING TEST TANK. EQUATIONS OF MOTION. SPRAY MOTION. BUBBLE AND GRAVITY MIGRATION. SIDEWARD MIGRATION. UPWARD MIGRATION DISTORTION.
AD-293 494 DIV. 22

•UNDERWATER SOUND

RAY ACOUSTICAL MODEL OF THE OCEAN USING A DEPTH-SOUND SPEED PROFILE WITH A CONTINUOUS FIRST DERIVATIVE.
AD-291 907 DIV. 25

•UPPER ATMOSPHERE

INSTRUCTION FOR PROCESSING RAW UPPER AIR DATA TO ESTABLISH CLIMATOLOGIES AT CONSTANT ALTITUDE LEVELS.
AD-292 118 DIV. 2

•URBAN AREAS
GROWTH

AN ECONOMETRIC MODEL OF METROPOLITAN DEVELOPMENT. THE ECONOMETRIC TECHNIQUE APPLIED TO LAND USE PROBLEMS.
AD-292 170 DIV. 32

•USSR
SPACE CAPSULES

SELECTED TRANSLATED ARTICLES FROM ZEMLYA-KOSMOS-ZEMLYA ON RUSSIAN SPACE FLIGHTS.
AD-292 224 DIV. 1

•V AGENTS
DETECTION

AEROSOL FLASH CAMERA AND ELECTROCHEMICAL DETECTOR FOR DETECTION AND ANALYSIS OF VX PARTICLE SIZE. MAIN COMPONENTS OF THE AEROSOL CAMERA ARE, FLASH ILLUMINATOR, OBJECTIVE LENS, IMAGE INTENSIFIER TUBE AND TV CAMERA.
AD-293 269 DIV. 3

•VACUUM SYSTEMS

EFFECTS OF VACUUM, AS FOUND IN SPACE, ON PLASTICS, METALS, ELASTOMERS, OXIDES, AND LUBRICANTS. VACUUM TERMINOLOGY, PHYSICAL CONSTANTS AND CONCEPTS OF SPACE VACUUM.
AD-292 929 DIV. 14

•VANADIUM ALLOYS

EVALUATION OF VANADIUM ALLOYS.
AD-292 244 DIV. 17

•VAPOR PLATING

HIGH-TEMPERATURE VAPOR DEPOSITION GROWTH OF SINGLE CRYSTALS OF SN (IV) AND CO OXIDES.
AD-292 114 DIV. 25

***VARIABLE RESISTORS**

PRODUCTION FACILITIES FOR MULTI-TURN METAL FILM TRIMMER RESISTORS. EQUIPMENT AND TOOLS FOR PRODUCING 350 UNITS FOR 8 HOUR SHIFT.
AD-291 972 DIV. 8

***VASOMOTOR DRUGS**
PHARMACOLOGY

THE PHARMACOLOGICAL EFFECTS OF DIBAZOL, A RUSSIAN VASODILATOR, ARE REVIEWED. ITS VASODILATOR EFFECT ON KIDNEY VESSELS, ANTISPASMODIC EFFECT ON THE HORNS OF THE UTERUS AND PLACENTA, AND HYPOTENSIVE EFFECT WERE DEMONSTRATED IN RABBITS. ITS THERAPEUTIC EFFECT IN TOXEMIAS OF PREGNANCY WAS DOCUMENTED AND DISCUSSED.
AD-292 213 DIV. 16

***VELOCITY**
RADAR ANALYSIS

CARTESIAN VELOCITY AND ACCELERATION FROM RANGE-ONLY DATA.
AD-292 116 DIV. 6

***VERBAL BEHAVIOR**

PAIRED-ASSOCIATES LEARNING UNDER VARIATIONS IN OCCURRENCES OF RESPONSE MEMBERS FROM AN EXPERIMENTAL AND FROM AN ORIENTATIVE-THEORETICAL POINT OF VIEW.
AD-292 193 DIV. 26

***VERY LOW FREQUENCY**

ELECTRONIC BROADBANDING OF ANTENNAS, ADMITTANCE OF A RECTANGULAR SLOT BACKED BY A RECTANGULAR CAVITY, SLOT ANTENNA IMPEDANCE MEASUREMENTS, AND HALLEN'S METHOD IN THE PROBLEM OF A CAVITY BACKED RECTANGULAR SLOT ANTENNA ARE SOME VLF ANTENNA-TECHNIQUES DISCUSSED.
AD-293 276 DIV. 8

***VIBRATION**

ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
AD-292 118 DIV. 29

METHOD AND EQUIPMENT FOR FINISHING METAL SURFACES BY VIBRO-ARC SURFACING.
AD-292 239 DIV. 26

EFFECT OF VIBRATION ON HEAT TRANSFER FROM CYLINDERS IN FREE CONVECTION.
AD-292 335 DIV. 9

USE OF VARIATIONAL METHODS IN PROBLEMS OF VIBRATION OF LIQUID AND LIQUID-FILLED BODIES. UNIVERSALITY AND STANDARDIZATION OF COMPUTER PROGRAMMING ARE SEEN AS POTENTIAL ADVANTAGES.
AD-292 340 DIV. 9

***VIBRATION**
STRESS (PHYSIOLOGY)

ONE-MINUTE TOLERANCE IN MAN TO VERTICAL SINUSOIDAL VIBRATION IN THE SITTING POSITION.
AD-292 704 DIV. 16

***VIBRATION ISOLATORS**
CONCRETE

DETERMINATION OF SPECIFIC GRAVITY AND ABSORPTION CAPACITY OF LIGHTWEIGHT AGGREGATES FOR LIGHTWEIGHT CONCRETE.
AD-293 402 DIV. 14

***VIDEO AMPLIFIERS**

RESTORATION OF QUENCHING AND SYNCHRONIZING PULSES IN THE VIDEO SIGNAL AFTER MAGNETIC RECORDING.
AD-292 231 DIV. 8

***VIDEO SIGNALS**

RESTORATION OF QUENCHING AND SYNCHRONIZING PULSES IN THE VIDEO SIGNAL AFTER MAGNETIC RECORDING.
AD-292 231 DIV. 8

***VIDEO SIGNALS**
INTERFERENCE

INTERFERENCE BLANKER AN/GPX-27 WHICH USES STORAGE TUBES TO ELIMINATE NONSYNCHRONOUS SIGNALS FROM RADAR BEACON VIDEO REPLIES.
AD-292 113 DIV. 6

***VISCOSITY**

VISCOSITY OF MIXTURES OF OILS (SILICONE AND PETROLEUM) CONSISTENT LUBRICANTS BY THICKENING WITH LI STEARATE AND CENESIN.
AD-292 202 DIV. 14

***VISUAL PERCEPTION**

PERCEPTION OF DISTORTION. 1. AN EXPERIMENTAL APPROACH TO ILLUSION.
AD-292 120 DIV. 28

***VISUAL PERCEPTION**
PSYCHOLOGY

FOUR STUDIES: PATTERNS OF EXPERIENCE AND THE PERCEIVED ORIENTATION OF THE NECKER CUBE; THE EFFECT OF SUBLIMINAL TONES UPON THE JUDGMENT OF LOUDNESS; THE APPROACH OF THE EXPERIMENTAL PSYCHOLOGIST; ANOMALOUS CONTRAST AND ASSIMILATION.
AD-292 330 DIV. 16

***VISUAL SIGNALS**
PERCEPTION

FOUR STUDIES: PATTERNS OF EXPERIENCE AND THE PERCEIVED ORIENTATION OF THE NECKER CUBE; THE EFFECT OF SUBLIMINAL TONES UPON THE JUDGMENT OF LOUDNESS; THE APPROACH OF THE EXPERIMENTAL PSYCHOLOGIST; ANOMALOUS CONTRAST AND ASSIMILATION.
AD-292 330 DIV. 16

***VOICE COMMUNICATION SYSTEMS**

COMPLETE MILITARY COMMUNICATIONS SYSTEM COVERING THE CONTINENTAL UNITED STATES, INTER-CONTINENTAL AREAS, AND THE SUPPORT REGIONS.
AD-291 999 DIV. 5

***WATER WAVES**

LINEAR SUPERPOSITION PRINCIPLES ARE APPLIED TO THE IRREGULAR MOTIONS OF NON-VENTILATED DIHEDRAL HYDROFOIL SYSTEMS IN RANDOM SEAS.
AD-292 985 DIV. 9

***WAVEGUIDE BENDS**

WAVEGUIDE COMPONENTS FOR OPERATION OVER A 5% BANDWIDTH CENTERED AT 93.75 KMC. COUPLERS, BENDS, FILTERS.
AD-292 127 DIV. 8

***WAVEGUIDE COUPLERS**

WAVEGUIDE COMPONENTS FOR OPERATION OVER A 5% BANDWIDTH CENTERED AT 93.75 KMC. COUPLERS, BENDS, FILTERS.
AD-292 127 DIV. 8

***WAVEGUIDE FILTERS**

WAVEGUIDE COMPONENTS FOR OPERATION OVER A 5% BANDWIDTH CENTERED AT 93.75 KMC. COUPLERS, BENDS, FILTERS.
AD-292 127 DIV. 8

***WAVEGUIDES**

FABRICATION AND TESTING OF SEVEN CONVOLUTION ELECTRON BEAM WELDED SERPENTINE LIGHTWEIGHT WAVEGUIDES.
AD-293 612 DIV. 8

***WEATHER FORECASTING**

DEVELOPMENT OF NUMERICAL MODELS FOR WEATHER PREDICTION.
AD-291 925 DIV. 2

PROCEDURES AND TABLES FOR FORECASTING DENSITY ALTITUDE, THE ALTITUDE IN THE STANDARD ATMOSPHERE AT WHICH A GIVEN DENSITY OCCURS.
AD-293 168 DIV. 2

APPLICATION OF RADAR DATA TO FORECASTING OF TERMINAL WEATHER CONDITIONS.
AD-293 421 DIV. 2

AN OBJECTIVE METHOD FOR FORECASTING AIR MASS THUNDERSTORMS AT ROBINS AF BASE, GEORGIA.
AD-293 604 DIV. 2

***WEATHER FORECASTING**
ATLANTIC OCEAN

WEATHER MAPS ANALYZED TO DEVELOP NUMERICAL WAVE FORECASTING PROCEDURES FOR THE NORTH ATLANTIC OCEAN.
AD-293 451 DIV. 2

***WEATHER FORECASTING**
MASSACHUSETTS

AN OBJECTIVE METHOD FOR FORECASTING NON-FRONTAL FOG AT OTIS AFB, MASSACHUSETTS.
AD-293 605 DIV. 2

***WEATHER FORECASTING**
NEW YORK

AN OBJECTIVE METHOD FOR FORECASTING STRONG AND GUSTY WINDS AT PLATTSBURGH AF BASE, NEW YORK
AD-293 607 DIV. 2

***WEATHER FORECASTING**
OKLAHOMA

AN OBJECTIVE METHOD FOR FORECASTING CEILING RSTRICTIONS DUE TO GULF STRATUS AT TINKER AF BASE, OKLAHOMA.
AD-293 603 DIV. 2

***WEIGHTLESSNESS**
SPACE FLIGHT

TRANSLATION ON WEIGHTLESSNESS DURING RECENT SPACE FLIGHTS OF RUSSIAN COSMONAUTS, TITOV AND GAGARIN. PROBLEMS ENCOUNTERED DURING THEIR FLIGHTS.
AD-292 227 DIV. 16

***WELDING FLUXES**

MECHANICAL PROPERTIES OF SPOT WELDED, BUTT WELDED, AND RIVETED JOINTS OF HASTELLOY R235 AND HAYNES ALLOY NO. 25 NI BASE ALLOYS.
AD-293 096 DIV. 17

***WELDS**

TEMPERATURE FIELD AND GRADIENTS IN WELDED DISK TYPE TURBINE ROTOR UNDER STARTING CONDITIONS; HEAT TRANSFER COEFFICIENTS.
AD-292 206 DIV. 27

***WIND**

DENSITY DISTRIBUTION, INTERLEVEL CORRELATIONS AND VARIATION WITH WIND.
AD-291 926 DIV. 2

PRESENTS WIND SCALES FOR SURFACE AND UPPER AIR FOR USE IN ANALYSIS OF METEOROLOGICAL PLOTTING MAPS.
AD-292 048 DIV. 2

***WIND**
ANALYSIS OF VARIANCE

VARIABILITY OF WIND AT TWO POINTS STUDIED IN TERMS OF THE COMPONENTS OF THE WIND CORRELATION TENSOR AS FUNCTIONS OF THE RELATIVE POSITIONS OF THE POINT. SEE ALSO AD-292 149 AND 292 150.
AD-292 158 DIV. 2

VARIABILITY OF WIND AT TWO POINTS STUDIED IN TERMS OF THE COMPONENTS OF THE WIND CORRELATION TENSOR AS FUNCTIONS OF THE RELATIVE POSITIONS OF THE POINT. SEE ALSO AD292 158 AND AD292 160.
AD-292 150 DIV. 2

TABLES FOR USE IN REFERENCE WITH PARTS I AND II OF THIS REPORT (AD-292 148 AND 292 149).
AD-292 160 DIV. 2

***WIND**
ATLANTIC OCEAN

THE AVERAGE HORIZONTAL WIND DRIVEN MASS TRANSPORT OF THE ATLANTIC FOR FEBRUARY IS OBTAINED BY NUMERICAL METHODS.
AD-293 427 DIV. 2

***WIND**
MOUNTAINS

THE CIRCULATION OF AIR IN AND NEAR VALLEYS AND MOUNTAINS. OBSERVATIONS WERE MADE PRIMARILY IN THE SUMMER MONTHS.
AD-292 699 DIV. 2

***WIND**
SURFACES

AN OBJECTIVE METHOD FOR FORECASTING STRONG AND GUSTY WINDS AT PLATTSBURGH AF BASE, NEW YORK.
AD-293 607 DIV. 2

***WIND**
VELOCITY

DIRECT MEASUREMENT OF THE MERIDIONAL CIRCULATION IN THE STRATOSPHERE DURING THE IGY.
AD-292 145 DIV. 2

THE CIRCULATION OF AIR IN AND NEAR VALLEYS AND MOUNTAINS. OBSERVATIONS WERE MADE PRIMARILY IN THE SUMMER MONTHS.
AD-292 699 DIV. 2

***X-RAY DIFFRACTION ANALYSIS**

IDENTIFICATION OF SEVERAL MONO-AND DI-SUBSTITUTED POLYCRYSTALLINE FERROCENES BY X-RAY DIFFRACTION ANALYSIS.
AD-292 011 DIV. 25

CRYSTALLINITY OF POLYOLEFINS. X-RAY DETERMENATION USING COMPARISON OF CRYSTALLINE AND AMORPHOUS PEAKS.
AD-293 291 DIV. 25

X-RAY DIFFRACTION ANALYSIS OF CALCIUM CARBONATE. DATA CONCERNING FACTORS AFFECTING QUANTITATIVE ANALYSIS OF CALCITE AND ARAGONITE IN DEEP-SEA CORES BY USE OF X-RAY DIFFRACTION. EFFECT OF GRINDING. STANDARD CURVE FOR PERCENTAGE ESTIMATION OF CALCITE IN SEDIMENT SAMPLES.
AD-293 293 DIV. 30

***X-RAY DIFFRACTION ANALYSIS**
FLUORESCENCE

DEVELOPMENT OF X-RAY FLUORESCENCE ANALYSIS TECHNIQUES FOR SMALL SAMPLES; A PROTOTYPE ATMOSPHERIC ELECTRON PROBE.
AD-293 426 DIV. 25

***XENON LAMPS**

HIGH-POWER GAS DISCHARGE LAMPS.
AD-292 410 DIV. 25

***YORK RIVER**

WAVEGUIDE COMPONENTS FOR OPERATION OVER A 5% BANDWIDTH CENTERED AT 93.75 KMC. COUPLERS, BENDS, FILTERS.
AD-292 127 DIV. 8

***ZINC**
SINGLE CRYSTALS

DISLOCATION MOBILITY IN ZN SINGLE CRYSTALS. DISLOCATION DENSITY AND CONFIGURATION WERE DETERMINED BEFORE AND AFTER STATIC LOADING AND STRESS PULSE LOADING.
AD-293 445 DIV. 25

FATIGUE STUDIES OF METAL CRYSTALS. SINGLE CRYSTALS OF SILVER AND ZINC WERE FATIGUED IN ALTERNATE HANDLING AT CONSTANT STRAIN AMPLITUDE OF 0.12% AND 0.2% FOR AG AND 0.01% FOR ZN.
AD-293 471 DIV. 17

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-291 948 Div. 1
(TISTA/GEC) OTS price $1.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
DESIGN APPROVAL TESTING OF THE RCA LOW LEVEL RADAR ALTIMETER.
Final rept.,
by M. Fontana. 18 Dec 62, 13p. (Rept. no. NADC-EL-6284)
Unclassified report

DESCRIPTORS: *Radio altimeters, Flight instruments, Frequency modulation, Design, Flight testing.

A limited design approval test was made of a low level radar altimeter, designated AN/APN-155. The altimeter, a conventional FM-CW type with altitude coverage from 0 to 5000 ft, intended for use in the F-110A aircraft, employs a solid state modulator. Solid state modulators, the next generation of radar altimeters should incorporate a solid state transmitter to eliminate weak design areas in present altimeters.

AD-292 072 Div. 1, 19
(TISTE/CAM) OTS price $4.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
ACTIVITY REPORT.
Oct 62, 38p. incl. illus. (ESD TDR 62-28)
Unclassified report

DESCRIPTORS: *Ground controlled approach radar, *Data processing systems, *Display systems, *Navigation, *Radio communication systems, *Lighting systems, *Safety, *Helicopters, Airplane landings, Approach lights, Digital systems, Hazards, Birds, Snow, Ice, Indicator lights, Flight testing, Airports.

Contents:
Approach and landing systems
Airport lighting systems
Communications
Data acquisition, processing and display
Navigation
Helicopter operations
Research
Aircraft safety
Weather

AD-292 093 Div. 1, 22
(TISTA/FRL) OTS price $1.10

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION. HLU-129/E LOADING DEVICE.
Dec 62, 4p. incl. illus. (Rept. no. TAC TR 62-56)
Unclassified report

DESCRIPTORS: *Bomb handling equipment, Military aircraft, Bomb clusters, Operation, Tests, Bomb racks.

The prototype HLU-129/E loading device was operationally tested with the MN-1A dispenser on all authorized positions on the F-100, F-104, and F-105 aircraft. Only one minor discrepancy was noted when evaluated with the F-100 and F-105 aircraft, and all three bomblets, the MK-106, MB-2, and MK-76, were loaded with success. With the minor discrepancies corrected, the loader will perform satisfactorily on the F-100, F-104 and F-105 aircraft. (Author)

AD-292 224 Div. 1
(TISTB/DGH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EARTH-SPACE-EARTH (SELECTED ARTICLES).
11 Oct 62, 29p. incl. illus. (Trans. no. FTD-TT-62-1416 from Zemlya-Zosmos-Zemlya, (Sbornik Materialov, Opublukovannykh V Gazete ''Pravda'' Izdatel'stvo ''Pravda'', Moskva, Issue no. 24, pp. 10, 13, 14, 27, 30, 31, 45-47, 51, 52, 56, 57 and 61, 16 Aug 62))
Unclassified report

DESCRIPTORS: *Space flight, *USSR, Manned, Space capsules.

Contents:
Vostok-3 in outer space
News from outer space
Vostok-4 in orbit
News from outer space
Research program is being executed successfully
Conversation in outer space
Food of gods
Precisely according to program
Before the completion of a historical flight
Good wishes to nations of the world

AD-292 229 Div. 1, 30
(TISTB/LMH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
KNOWLEDGE IS POWER (SELECTED ARTICLES).
31 Oct 62, 27p. (Trans. no. FTD-TT-62-1304 from Znaniye-Sila, no. 3, pp. 17-19, 1962)
Unclassified report

DESCRIPTORS: *Airplanes, *Aerodynamics, Engineering, Aeronautics, Configuration, Hypervelocity vehicles, Hypersonics, Supersonic flow, Superaerodynamics, USSR, Scientific research.

Contents:
Secrets of the blue jet stream
Barrier of the unknown

AD-292 307 Div. 1
(TISTP/TL) OTS price $1.10

Northrop Space Labs., Hawthorne, Calif.
RADIATION RESISTANT FLIGHT CONTROL SYSTEMS.
Progress rept., 1 Sep-30 Sep 62,

by L. Roth. 20 Dec 62, 4p.
(Contract AF 33(657)7851)
Unclassified report

DESCRIPTORS: *Control systems, *Radiation effects, *Radiation damage, Van Allen radiation belt, Protons, Electrons, Photons, X rays, Organic materials, Semiconductors, Solid state physics, Measurement.

AD-292 600 Div. 1
(TISTA/FRL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IN THE CITY OF ''THE CELESTIAL BROTHERS'',
by Ye. Ryabchikov. 9 Nov 62, 7p. (Trans. no. FTD-TT-62-1583 from Pravda, pp. 4, 7 Aug 1962)
Unclassified report

DESCRIPTORS: *Flight simulators, *Space flight, Weightlessness, Space medicine, Centrifuges, USSR, Pilots, Military training.

AD-292 608 Div. 1
(TISTA/GEC) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AERODYNAMIC INDUSTRY (SELECTED ARTICLES).
15 Nov 62, 65p. incl. illus. tables, refs. (Trans. no. FTD-TT-62-696 from Promyshlennaya Aerodinamika, Shumoglusheniye, Oborongiz, Issue 18, (Chap. 6-9) pp. 54-107, 1960)
Unclassified report

DESCRIPTORS: *Aircraft industry, Microphones, Sound, Pressure, Acoustics, Instrumentation, Electronic equipment, Magnetic tape, Noise, USSR, Exhaust pipes.

Contents:
A system for calibrating microphones at high sound-pressure levels
An electronic correlograph for acoustic measurements
Using a ring of ferromagnetic tape in spectral analysis of noise
An experimental study of mufflers in the form of pipes with branches

AD-292 615 Div. 1
(TISTA/GEC) OTS price $1.10

Foreign Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE PREPARATION OF MAN FOR FLIGHTS INTO THE COSMOS,
by Vladislav Loginov and Leionid Salmanov.
20 Nov 62, 7p. incl. illus. (Trans. no. FTD-TT-62-1592 from Kommunist, p. 3, 8 Sep 62)
Unclassified report

DESCRIPTORS: *Space flight, Simulation, Flight simulators, USSR, Pilots, Military training.

A study was made of training pilot-cosmonauts for cosmic flight problems, which consist of: extremely low barometric pressure, the absence of molecular oxygen, cosmic radiation, severe temperature conditions, the danger of meteors; noise, vibration, and accelerations experienced over the powered portions of the ascent and descent of the craft, and also the weightlessness during the time of orbital flight; and the effect of the artificial atmosphere of the cabin, the work and rest schedule without the 24-hour time periods to which man is accustomed, the peculiarities in eating, restriction of movement, and psychological strain. (Author)

AD-292 672 Div. 1
(TISTA/FRL) OTS price $4.60

Federal Aviation Agency, Washington, D. C.
DIGEST OF ECONOMIC IMPACT OF WEATHER INFORMATION ON AVIATION OPERATIONS.
Memorandum rept.
Dec 62, 38p. incl. tables.
(Proj. 151-1S)
Unclassified report

DESCRIPTORS: *All-weather aviation, Weather forecasting, Weather communications, Operation, Casualties, Aviation safety, Maintenance, Costs, Air transportation, Economics.

Estimates are presented of the economic penalties to aviation caused by the lack of or inadequate weather information, the cost of implementing an improved weather system, the economic benefits that such a system would bring, and finally, the expected benefit-to-cost ratio. (Author)

AD-292 761 Div. 1
(TISTB/DGH) OTS price $5.60

Stencel Aero Engineering Corp., Asheville, N. C.
MODULAR RESTRAINT, RECOVERY, AND SURVIVAL SYSTEM.
Final engineering rept.
24 Aug 62, 1v. incl. illus. table.
(Contract NOw 61-0535-c)
Unclassified report

DESCRIPTORS: *Ejection seats, Pilot seats, Effectiveness, Operation, Jettisonable equipment, Aircraft seats, Physiology, Acceleration tolerance, Shock, Simulation, Measure theory, Specifications, Survival, Evasion, Design.

A modular system, consisting of a seat back and bottom with a parachute bridle connected to the structure, provides greatly increased pilot restraint, comfort, and convenience by use of a combined flight and parachute harness. The system offers a survival capability which carries full escape automation beyond the point of parachute opening and through touchdown on either land or water. Development of the modular seat included: bridle geometry studies, opening shock studies, para-raft inflation studies, deceleration device development, various special tests, a system test series, and restraint development yielding a superior restraint system complete with hardware. Operational modes provided for were: automatic water entry with man in inflated raft, seated land touchdown, foot-first land touchdown, overside bailout, and ditching. Further development, already underway under other contracts, will combine this system with a rocket cushioning device; and later, the addition of the ballistic parachute should give a much more highly refined escape system than any presently in use. (Author)

AD-292 957 Div. 1
(TISTA/GEC) OTS price $3.60

Princeton U., N. J.
A NOTE ON THE EFFECT OF HELICOPTER DYNAMICS ON STEEP INSTRUMENT APPROACHES,
by E. Seckel, J. J. Traybar, and G. E. Miller.
Feb 62, 25p. incl. illus. tables, 10 refs. (Rept. no. 600)
(Contract DA 44-177-tc-524; Proj. 9-38-01-000)
Unclassified report

DESCRIPTORS: *Helicopters, Flight testing, *Dynamics, Instrument landings, Stability, Pilots, Attitudes, Velocity, Damping, Turbulence, Aerodynamics, Flight paths.

Flight tests with a variable stability aircraft were conducted to determine the influence on pilot opinion of certain stability parameters in steep instrument approaches in turbulence with a helicopter. The parameters varied were: velocity stability, angle of attack stability and angular damping. It was determined that high values of angular damping were required in order to obtain acceptable approaches for the conditions of the test runs. The pilots readily noticed changes in angular damping and altered pilot opinion accordingly, whereas changes in the dynamics due to changes in the velocity stability or angle of attack stability were of much less concern and generally had an inconsistent influence on pilot opinion, even for relatively large increments of velocity stability and attack stability. The pilots felt that the dynamics changes were masked by the strong angular damping, turbulence and the extremely difficult nature of the particular instrument approach tracking task, which required great concentration with frequent and rapid control action. All the problems associated with slow flight under instrument conditions in the presence of turbulence with steep gradient aircraft were evident to an increasing degree as glide slope angle was increased and flight speed decreased. (Author)

AD-293 236 Div. 1
(TISTA/GEC) OTS price $8.10

Systems Technology, Inc., Inglewood, Calif.
HANDLING QUALITIES IN SINGLE-LOOP ROLL TRACKING TASKS: THEORY AND SIMULATOR EXPERIMENTS.
Final rept.,
by T. S. Durand and H. R. Jex. Nov 62, 77p. incl. illus. tables, 18 refs.
(Contract AF 33(616)7866, Proj. 8219)
(ASD TDR 62-507) Unclassified report

DESCRIPTORS: *Roll, *Aircraft, Theory, Tests, Ailerons, Simulation, Handling, Frequency, Damping, Control systems, Human engineering, Analysis, Stability (Lateral).

The systems analysis theory of aircraft handling qualities is applied to the task of closed-loop compensatory roll tracking by ailerons alone, and exploratory experiments in a fixed-base simulator are used to verify and refine the theory. The analysis refines and extends the earlier theory of McRuer and Ashkenas, shows the dominant role of the basic spiral roll mode closure in determining the Dutch roll mode interactions, and describes the implications of these interactions on closed-loop tracking performance, pilot-adopted equalization, and probable handling qualities ratings. The key theoretical parameters evolved are: dominant closed-loop spiral roll mode frequency and damping ratio; average Dutch roll frequency; Dutch roll frequency ratio; uncompensated closed-loop Dutch roll damping ratio; and Dutch roll phase dip. The simulator results corroborated the theory and give specific values for the variation in ratings and performance with these parameters. Certain observations of nonsteady pilot behavior, interaction between input cut-off frequencies and Dutch roll dynamics, effects of other tasks such as step-aileron rolls using ailerons plus rudder, and extrapolation of single-loop results to the multiloop flight situation are discussed. (Author)

AD-293 413 Div. 1, 12, 26
(TISTW/EJH) OTS price $1.60

Forest Products Lab., Madison, Wis.
COMPRESSIVE AND SHEAR PROPERTIES OF TWO CONFIGURATIONS OF SANDWICH CORES OF CORRUGATED FOIL,
by G. H. Stevens. Dec 62, 5p. illus. tables. (Rept. no. 1889)
(Contract AF 33(616)61-06)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Honeycomb cores, *Aluminum, Foils, Airframes, Configuration, Sandwich construction, Shear stresses, Mechanical properties, Test methods.

Compressive and shear properties were determined for two configurations of sandwich cores of corrugated aluminum foil. The corrugated foil was assembled either with the corrugation flutes parallel, to form the usual honeycomb core with hexagonal cells, or with the corrugation flutes crossbanded and cut so that the corrugation flutes were at 45 degrees to the sandwich facing. Compressive and shear strength values were lower for the crossbanded core than for the honeycomb core. (Author)

AD-293 628 Div. 1
(TISTA/FRL) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 28, 1-30 Sep 62,
by C. V. Lassmann. 8 Oct 62, 2p. (Engineering rept. no. 4528)
(Contract NOw 60-0060-c)
Unclassified report

DESCRIPTORS: *Jet fighters, *Airplane protuberances, Research program administration, Naval aircraft, Design, Tests, Costs, Refueling-in-flight.

Development of the Beech Model 385 Air Refueling Store has consisted of work on value engineering, which has progressed to the detail design phase. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-291 925 Div. 2
(TISTP/JW) OTS price $9.10

Air Force Cambridge Research Labs., Bedford, Mass.
LECTURES ON NUMERICAL WEATHER PREDICTION,
by Louis Berkofsky. July 62, 99p. incl. illus. 17 refs. (AFCRL 62-684)
(Proj. 8628)
Unclassified report

DESCRIPTORS: *Weather forecasting, *Numerical analysis, Climatic factors, Hurricanes, Winds, Oceanography, Integrals, Mathematical analysis, Meteorology.

This set of notes is based on a series of lectures presented at the Department of Meteorology of the Hebrew University of Jerusalem during 1961 - 1962. The topics are selected so as to trace the development of numerical models, from the geostrophic to the nongeostrophic. Application for prediction of specific phenomena, such as the hurricane and the sea breeze, is discussed. Much emphasis is placed on discussion of integral constraints. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-291 926 Div. 2
(TISTP/JW) OTS price $9.60

Air Force Cambridge Research Labs., Bedford, Mass.
DENSITY DISTRIBUTION, INTERLEVEL CORRELATIONS AND VARIATION WITH WIND,
by Allen E. Cole and Arnold Court. July 62, 113p. incl. illus. tables, 8 refs. (Air Force Surveys in Geophysics no. 151; AFCRL 62-815)
(Proj. 8624)

Unclassified report

DESCRIPTORS: *Wind, *Atmospheric, Satellite vehicles, Density, Atmosphere, Diurnal variations, Climatic factors, Distribution, Tables.

Geographical, seasonal, and day-to-day variations in the vertical distribution of atmospheric density for altitudes up to 30 km are analyzed. Variability is least at 7 to 8 km, the isopycnic level, where densities do not depart from the standard by more than 1 or 2 percent in any season or area. Between 24 and 26 km, density changes little with latitude but markedly with season. At the level of greatest seasonal variability, around 15 km, the relative departures from standard of mean seasonal densities is strictly according to latitude. Largest negative departures occur at the northernmost location; largest positive, at the southernmost. The greatest difference between the two extreme profiles, nearly 20 percent, occurs in winter. The largest day-to-day variations around monthly means occur near the tropopause. Coefficients of variation range from approximately 2 percent at Tampa in the summer to 6 percent at St. Paul Island in the winter. Although the correlation of density with wind speed is significant statistically, and of theoretical interest, it may have little practical importance in the design of aerospace vehicles. (Author)

AD-291 931 Div. 2
(TISTP/JW) OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
OBSERVATIONS OF THE DIURNAL VARIATION OF 5577 A(OI) AT SACRAMENTO PEAK, NEW MEXICO AND NATICK, MASSACHUSETTS,
by H. E. Cronin and S. M. Silverman. Oct 62, 7p. incl. illus. tables, 6 refs. (AFCRL 62-1024)
(Proj. 8627)

Unclassified report

DESCRIPTORS: *Diurnal variations, Weather stations, Atmosphere, Excitation, Sky brightness, Night sky, Meteorological data, New Mexico, Massachusetts.

Observations of the diurnal variation of 5577 A(OI) for the same night for four nights in September 1961 at Sacramento Peak, New Mexico and Natick, Massachusetts were compared. The product moment correlation coefficient for the intensities at the same local mean times was zero, showing that no correlation existed. Correlation coefficients were then calculated using hourly and daily values for Sacramento Peak with Fritz Peak, Colorado, Rapid City, South Dakota, and Haute Provence, France, using IGY-IGC data. These were found to be significant at better than the 5% significance level except for the Sacramento Peak-Haute Provence daily correlation. The reason for the discrepancy between this correlation and that for Sacramento Peak-Natick is not known at this time. Additional experimental work is needed to resolve the discrepancy or determine its cause. (Author)

AD-291 961 Div. 2
(TISTP/JW) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
A STUDY OF SACRAMENTO PEAK FLARES. IV: FILAMENT DISAPPEARANCES, FLARE SPRAYS, AND LOOP PROMINENCES,
by H. J. Smith and W. D. Booton. Oct 62, 53p. incl. illus. tables (GRD Research notes no. 58; AFCRL-472, vol. 4)
(Proj. 7649)

Unclassified report

DESCRIPTORS: *Solar flares, Flames, Detection, Measurement, Solar corona, Statistical analysis.

Sacramento Peak flare films provide nearly complete, continuous observational data for other forms of solar activity than just chromospheric flares. The character of the observations is optimum for flare detection and measurement, but for other phenomena the material is less satisfactory. The report tabulates and gives details of major occurrences in recent years of three types of events: sudden disappearances, flare sprays, and coronal loops. (Author)

AD-292 036 Div. 2, 12
(TISTP/GRW) OTS price $8.10

Air Force Cambridge Research Labs., Bedford, Mass.
CLOUD INTERPRETATION FROM SATELLITE ALTITUDES,
by John H. Conover. July 62, 77p. incl. illus. 16 refs. (Rept. no. AFCRL 62-680; Research note no. 81)

Unclassified report

DESCRIPTORS: *Clouds, *Satellite vehicles, Photographic intelligence, Orbital flight paths, Classification, Albedo (Astronomy), Photographic analysis.

Comparisons of TIROS I pictures and simultaneous ground observations or aerial photography of clouds were made to prepare guides to cloud interpretation from satellite pictures. These are based on the form, pattern, texture, structure, brightness, and dimensions of the patterns and shapes of the images. Factors affecting cloud brightness and the problems of measuring brightness are briefly discussed. The guides provide clues for determining the cloud amount, cloud genera, and mesoscale cloud and ground patterns. Representative pictures accompany the guides. The significance of some of the mesoscale patterns is discussed and suggestions are made for the use of routine cloud reflectivity contouring. A selection of TIROS pictures from which the guides were prepared, rectifications, and abbreviated synoptic maps for background information are shown and discussed in an Appendix. Appropriate surface reports have been added to the pictures and, in some cases, accompanying aerial photographs from a U-2 aircraft are included. (Author)

AD-292 045 Div. 2
(TISTP/JW) OTS price $6.60

Naval Air Station, Norfolk, Va.
METEOROLOGICAL WIND-SCALES,
by James P. King, Herman B. Wobus and others. 1962, 60p. incl. illus. tables.
(NAVWEPS 50-1P-551)

Unclassified report

DESCRIPTORS: *Wood, *Meteorology, Gradiometers, Wind direction indicators, Acceleration, Pressure, Fluid flow, Climatic factors, Equations, Numerical analysis, Atmospherics.

AD-292 089 Div. 2, 25
(TISTP/WH) OTS price $4.60

Dartmouth Coll., Hanover, N. H.
SOME PHYSICAL AND CHEMICAL MEASUREMENTS ON ICE WITH REFERENCE TO THE WARD HUNT CORES.
Final rept.,
by John B. Lyons and Lars E. Persson. 1 Oct 62, 35p. incl. illus. tables, refs.
(Contract AF 19(604)8366, Proj. 7628)
(AFCRL 62-1067) Unclassified report

DESCRIPTORS: *Canada, *Ice, *Petrology, *Gases, *Mechanical properties, *Geology, Oxygen.

Cores collected from the Ward Hunt shelf during the 1960 field season were analyzed for oxygen contents and gas pressures in an attempt to probe further into the mode of origin and history of the shelf. Three hundred O2 analyses show a wide scatter, and fail to bring out predicted relationships between petrologically determined ice types and gas compositions. Five hundred gas pressure determinations likewise yield unexpectable results. Because the parameters of density, salinity, texture, degree of preferred orientation, grain size, and ice type were known, it was also expected that some type of correlation might be determined between ice strength and these parameters. Shear tests at uniform loading rates and at fixed temperatures failed, however, to bring out any systematic or predictable relationships. Diffusion experiments were run on polycrystalline ice, using tritium as a source material, and nuclear stripping film and liquid scintillation counting for detection. Results led to such high calculated free energies of activation for diffusion (3.5 kcal/mole) as to suggest abnormal diffusion characteristics. (Author)

AD-292 090 Div. 2
(TISTP/WH) OTS price $8.60

Massachusetts Inst. of Tech., Cambridge.
TRANSFER THROUGH THE TROPOPAUSE AND WITHIN THE STRATOSPHERE,
by Reginald E. Newell. 25 Oct 62, 68p. illus. tables, refs. (Rept. no. 7)
(Contract AF 19(604)5223)
Unclassified report

DESCRIPTORS: *Radioactive isotopes, *Tungsten, *Air mass analysis, *Air, *Atmosphere, *Stratosphere, Motion.

The evidence for tropospheric-stratospheric mass exchange is reviewed. A large fraction of the exchange appears to occur in the vicinity of the middle latitude tropopause discontinuity and the concomitant jet stream. Calculations of the flux of radioactive substances in the troposphere support this view. Indications are that the large-scale quasi-horizontal transient eddies can transport ozone polewards in sufficient quantities to account for the spring build-up of ozone. Such large-scale mixing, as opposed to mean meridional motions, also allows explanation of the distribution of radioactive tungsten in the stratosphere. Transports appear to be polewards and downwards between latitudes 20 and 60 degrees. Independent meteorological evidence support the mixing scheme. The observed counter-gradient eddy flux of heat can be explained from the model. Distributions of certain other trace substances are not at variance with the model. From a preliminary examination of the angular momentum transport processes up to 60 km it appears that transient eddies are also important to these levels but there is not yet sufficient global coverage to evaluate the contributions due to mean motions and standing eddies. (Author)

AD-292 115 Div. 2
(TISTP/JW) OTS price $6.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
ABMA DATA REDUCTION PROGRAM IN UPPER AIR CLIMATOLOGY,
by Werner H. Alfuth. 17 Oct 61, 58p. incl. illus. tables, 6 refs. (Rept. no. RR-TR 61-6)
Unclassified report

DESCRIPTORS: *Upper atmosphere, *Meteorological data, Data processing systems, Climatic factors, Air, Pressure, Temperature, Density, Frequency, Barometric pressure.

Instructions are presented on the processing of raw upper air data for the sake of establishing climatologies at constant altitude levels. Statistical parameters of barometric pressure, air temperature, air density, and wind will be derived from the original data of individual rawinsonde ascents. All derivations are performed numerically in order to exclude any biases that might be caused by the personal equation of evaluators in the case of graphical evaluation of rawinsonde ascents. The electronic data processing starts out with checks for complete information on the punch cards and will eventually lead to values of atmospheric quantities at prescribed levels of cumulative percentage frequency. (Author)

AD-292 145 Div. 2
(TISTP/WH) OTS price $7.60

Massachusetts Inst. of Tech., Cambridge.
DIRECT MEASUREMENT OF THE MERIDIONAL CIRCULATION IN THE STRATOSPHERE DURING THE IGY,
by Abraham H. Oort. 15 Oct 62, 73p. incl. illus. tables, 15 refs. (Rept. no. 6)
(Contract AF 19(604)5223)
Unclassified report

DESCRIPTORS: *Stratosphere, *Meteorology, *Wind, *Meteorological data, *Air mass analysis, Northern hemisphere, Velocity.

The mean meridional circulation in the stratosphere of the northern hemisphere is determined from IGY data available for a network of approximately 240 stations during the period July 1957 - June 1958. Zonal averages for every 5 degrees latitude from the equator to 80 degrees N are presented. The yearly average suggests at 100 mb a three cell pattern with poleward motion north of 55 degrees N, equatorial motion from 15 to 55 degrees N and weak poleward motion from the equator to 15 degrees N. At higher levels equatorward motions are observed in middle and low latitudes. The highest meridional velocity of +60 cm/sec is observed at 70 degrees N at the 100 mb level. These averages are compared with similar results for the southern hemisphere. Vertical velocities, computed adiabatically at 75 and 40 mb, made it possible to estimate the contribution of the adiabatic heating to the horizontal meridional velocities at 50 mb, and also to give an estimate of the diabatic heating itself. (Author)

AD-292 156 Div. 2
(TISTP/JW) OTS price $4.60

Columbia U., New York.
DEVELOPMENT OF THE HORSESHOE COVE SHORELINE, SANDY HOOK, NEW JERSEY,
by Gustavo A. Antonini. 1962, 34p. incl. illus. tables, 4 refs. (Technical rept. no. 3)
(Contract Nonr-26668, Proj. NR 388-057)
Unclassified report

DESCRIPTORS: *Beaches, *Mapping, Ocean bottom, Aerial photography, Tables, Instrumentation, Erosion, New Jersey.

Spit-bars, representing stages in the historical development of a prograding shoreline, were mapped at Horseshoe Cove, Sandy Hook, New Jersey. Both photogrammetric and field surveying methods were used. An offshore bar, genetically related to the foreshore spip-bars and extending westward into Sandy Hook Bay, was mapped by transit and theodolite. Mechanical analysis of the relatively fine sand of the offshore bar showed all samples to be well sorted but with an arithmetic mean diameter increasing shoreward. Eleven sets of vertical aerial photographs covering the period 1947 through 1961 and radial and transverse profiles taken during the 1959, 1960, and 1961 summer field seasons were analyzed. Retrogradation of the northwest-facing shoreline progressed at an average rate of 11.5 feet per year. From instrument station S-1 through E progradation occurred at an average rate of 9.0 feet per year. The shoreline between S-7 and F is a fulcrum zone where only minor changes in shoreline position occurred over the period of study. (Author)

AD-292 158 Div. 2
(TISTP/JW) OTS price $12.00

Kaman Nuclear, Colorado Springs, Colo.
TWO-POINT VARIABILITY OF WIND, VOLUME I.
Final rept.,
by C. Eugene Buell. July 62, 1v. incl. illus. tables, refs. (Rept. no. KN-173-62-2(FR), vol. 1)
(Contract AF 19(604)7282, Proj. 8624)
(AFCRL 62-889, vol. 1) Unclassified report

DESCRIPTORS: *Wind, Tensor analysis, Meteorology, Altimeters, Surfaces, Analysis of variance.

The variability of wind at two points is studied in terms of the components of the wind correlation tensor as functions of the relative positions of the point. When the points lie on the same isobaric surface and winds are observed simultaneously, the correlations may be approximated quite simply by an empirical expression containing the basic errors of observation and intensity of small scale eddies and a size parameter. The variation of the size parameter with isobaric level and season over the northern hemisphere is studied. The simplest form of these correlations is attained when winds are resolved into components along and across the line joining the two points concerned. When the two points are at different levels or the winds are observed at different times (or both), the usual resolution into longitudinal and meridional components presents a simple description. When the two points concerned are separated by less than 100 n mi (more or less), the effect of errors of observation and small scale eddies require different handling. Doppler navigator winds observed at frequent intervals provide information on two-point wind variability down to distances of a few miles and on the structure of meso-scale eddies. (Author)

AD-292 159 Div. 2
(TISTP/JW) OTS price $14.50

Kaman Nuclear, Colorado Springs, Colo.
TWO-POINT VARIABILITY OF WIND, VOLUME II.
Final rept.,
by C. Eugene Buell. July 62, 214p. incl. illus. tables (Rept. no. KN-173-62-2(FR) vol. 2)
(Contract AF 19(604)7282, Proj. 8624)
(AFCRL 62-889, vol. 2) Unclassified report

DESCRIPTORS: *Wind, Tensor analysis, Meteorology, Surfaces, Shear stresses, Meteorology, Analysis of variance.

AD-292 160 Div. 2
(TISTP/JW) OTS price $21.50

Kaman Nuclear, Colorado Springs, Colo.
TWO-POINT VARIABILITY OF WIND, VOLUME III.
Final rept.,
by C. Eugene Buell. July 62, 172p. incl. tables.
(Rept. no. KN-173-62-2 (FR) vol. 3)
(Contract AF 19(604)7282, Proj. 8624)
(AFCRL 62-889, vol. 3) Unclassified report

DESCRIPTORS: *Wind, Tensor analysis, Meteorology, Altimeters, Surfaces, Tables, Analysis of variance.

AD-292 167 Div. 2, 6, 30
(TISTP/WH) OTS price $5.60

Electrical Engineering Research Lab., U. of Texas, Austin.
A DIGITAL METEOROLOGICAL DATA-ACQUISITION SYSTEM,
by W. S. Mitcham. 30 Sep 62, 47p. incl. illus. tables (Rept. no. 4-06; Scientific rept. no. 1)
(Contract AF 19(604)5556, Proj. 7655)
(AFCRL 62-1087) Unclassified report

DESCRIPTORS: *Jet streams (Meteorology), *Meteorological radar, *Data processing systems, *Digital systems, *Meteorological data, Wind, Temperature, Thermocouples, Punched card methods.

Some aspects of the design of the digital meteorological data-acquisition system installed on the Cedar Hill Television Tower near Dallas, Texas, are developed. A discussion is made of the design decisions and techniques employed in developing this system. A detailed development of a novel temperature-difference measuring technique is presented. System design characteristics are presented as a detailed system block diagram. Specific circuit descriptions are beyond the scope of this report, but references to details are provided. System operation and performance data are provided for the first year of operation. (Author)

AD-292 196 Div. 2
(TISTP/LMH) OTS price $7.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE STUDY OF NOCTILUCENT CLOUDS (SELECTED PARTS).
30 Oct 62, 75p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1341 from Issledovaniya Serebristykh Oblakov. Leningrad, Izdatel'stvo Leningradskogo Universiteta, no. 1, pp. 3-84, 1960)
Unclassified report

DESCRIPTORS: *Meteorology, *Night sky, *Clouds, Colorimetry, Sky, Sky brightness, Climate, Photography, USSR.

Contents:
The apparent frequency of the appearance of noctilucent clouds according to observations by the stations of the hydrometeorological service network in 1957 and 1958.
Certain cases of theappearance of bright a noctilucent clouds during the summer of 1959.
Photometric and colorimetric observations of noctilucent clouds during the summer of 1959.
The absolute photometry of the twilight sky and noctilucent clouds.

AD-292 230 Div. 2, 25
(TISTP/JW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TRANSACTION OF THE CONFERENCE OF THE RESEARCH ON THE TWINKLING OF STARS (SELECTED ARTICLES). 7 Nov 62, 20p. incl. illus. tables (Trans. no. FTD-TT-62-1343 from Soveshchaniya po Issled. Mertsaniya Zvezd., Moscow-Leningrad AN SSSR, pp. 33-46 and 57-62, 1959)
Unclassified report

DESCRIPTORS: *Atmospherics, *Light, Oscillation, Translations, Stars, Conferences, Earth, Sources.

AD-292 243 Div. 2
(TISTP/JW) OTS price $4.60

McGill U. (Canada).
ALBEDO OF ARCTIC SURFACES,
by P. Larsson and Svenn Orvig. Oct 62, 41p. incl. illus. tables, 18 refs. (Publication in Meteorology no. 54; Scientific rept. no. 6) (Contract AF 19(604)7415, Proj. 8623) (AFCRL 62-1069). Unclassified report

DESCRIPTORS: *Albedo, *Surfaces, Tables, Radiation effects, Sun, Reflections, Climatic factors, Arctic regions.

Tabulations of area occupied by 5% albedo classes per 5 degrees latitude belt expressed as a percentage of the total area of each belt are presented. These tabulations are based upon the monthly maps which made up the atlas. In the earlier publication the spatial distribution was shown visually, which necessitated the use of wide albedo groups (20% intervals). Such a wide grouping does not permit calculations to be made of net solar radiation in the Arctic areas. Therefore, in order to supply more detailed information for this task, the maps were re-examined. In the course of the re-examination specific albedo values, based upon data given in the literature examined, were assigned to the classes used in the maps. Transitional zones, where applicable, were inserted by assuming a gradient of albedo between classes. Albedos are tabulated for both direct and diffuse radiation conditions where they differ significantly. The direct radiation albedo information is presented graphically for each month in the form of stereograms. Tables of solar declination and duration of daylight for areas north of 60 degrees N are also given. (Author)

AD-292 254 Div. 2, 15
(TISTP/TL) OTS price $4.60

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
ON THE SUPER-POTENTIALS IN THE THEORY OF NEWTONIAN GRAVITATION II. TENSORS OF HIGHER RANK, THE POTENTIALS AND THE SUPER-POTENTIALS OF HOMOGENEOUS ELLIPSOIDS. ON THE POINT OF BIFURCATION ALONG THE SEQUENCE OF THE JACOBI ELLIPSOIDS,
by S. Chandrasekhar and Norman R. Lebovitz. Sep 62, 46p. refs. (Rept. no. EFINS-62-54/55/56) (Contract Nonr-212124)
Unclassified report

DESCRIPTORS: *Gravity, *Tensor analysis, *Ellipsoids, *Perturbation theory, *Partial differential equations, Vector analysis, Sequences, Theory.

AD-292 643 Div. 2, 6
(TISTP/TL) OTS price $1.60

Genoa U. (Italy).
RADIOGONIOMETRIC INVESTIGATIONS OF THUNDERSTORMS AND CLOUDS OF GREAT ELECTRICAL ACTIVITY.
Final technical rept. no. 1, 1 Oct 61-30 Sep 62. Oct 62, 17p. incl. illus. 6 refs.
(Contract DA 91-591-EUC-1738)
Unclassified report

DESCRIPTORS: *Thunderclouds, *Storms, *Lightning, *Goniometers, Radio equipment, Direction finding, Antennas, Errors.

The first subject considered in this analysis is the precision obtainable with the NSR (Narrow Sector Recorder, after Lugeon-Nobile) and with the CRDF (Cathode Ray Direction Finder.) The errors forthcoming in the use of the two instruments are discussed. The requirements and the procedures to be applied for reducing these errors to a minimum are indicated. Particularly developed was the treatment of the possible errors in the coupling from two CRDF-stations: the equation of the curves joining all coupling-points where the mean planimetric error assumes a constant value was derived. The circuit diagrams of the CRDF are given. An example is developed relative to the thunderstorm situation which occurred in southern France on July 1st, 1962, which demonstrates the performance of the CRDF-method in the synoptical analysis, with respect to the other procedures. (Author)

AD-292 649 Div. 2, 25
(TISTP/TL) OTS price $1.60

Air Force Office of Scientific Research, Washington, D. C.
STELLAR SIMULATOR,
by William F. Chambers. Dec 62, 13p. incl. illus. table (Rept. no. AFOSR/DRA 62-22)
Unclassified report

DESCRIPTORS: *Interstellar matter, *Feasibility studies, *Simulation, *Stars, *Blackbody radiation, Light, Spectrophotometers.

An analysis is presented which shows the feasibility of a system that will reproduce the blackbody radiation spectrum of any star by forming the spectrum of a source, choosing the appropriate portions of the formed spectrum, and recombining the chosen portions into white light. (Author)

AD-292 680 Div. 2
(TISTM/EJH) OTS price $11.50

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE.
Final rept., Aug 61-Aug 62,
by L. H. Aller. Sep 62, 141p. incl. illus. tables, refs. (Rept. no. 03719-6-F)
(Contract AF 49(638)807)
Unclassified report

DESCRIPTORS: *Stars, *Nebulae, *Chemical elements, *Astronomy, Spectrographic analysis, Hydrogen, Helium, Tables, Neon, Oxygen, Ions, Electrons, Density.

Contents:
Energy distribution in globular star clusters
Data for southern globular clusters
Measurements of the energy distributions in southern globular clusters
Spectrophotometry of the Wolf-Rayet star of gamma 2 velorum
The hydrogen/helium ratio in HD 96446

The emission nebulosities in the large Magellanic cloud
Emission nebulosities in the small Magellanic cloud
Photographic region of the spectrum of NGC 7009
Report on research carried out at the University of Michigan and supported by the U.S.A.F. under Contract No. AF 49(638)807

AD-292 699 Div. 2
(TISTP/JW) OTS price $14.50

Washington U., Seattle.
PART A: ON VALLEY AND MOUNTAIN WINDS III. PART B: VALLEY WIND THEORY.
Final rept.,
by Norman Thyer and K. J. K. Buettner. July 62, 214p. incl. illus. tables, 55 refs.
(Contract AF 19(604)7201, Proj. 7655)
(AFCRL 62-1082) Unclassified report

DESCRIPTORS: *Wind, *Atmospherics, Theodolites, Measurement, Diurnal variations, Meteorological balloons, Velocity, Mountains.

AD-292 725 Div. 2, 9
(TISTP/JW) OTS price $1.10

Manchester Coll. of Science and Tech. (Gt. Brit.).
LABORATORY SIMULATION OF LUNAR LUMINESCENCE.
Annual summary rept. no. 2,
by J. E. Geake, M. D. Lumb, and J. Derham. Mar 62, 5p.
(Contract AF 61(052)379)
(AFCRL 62-1099) Unclassified report

DESCRIPTORS: *Luminescence, *Simulation, Excitation, Meteorites, Instrumentation, Measurement, Moon, Laboratory equipment.

A grating monochromator was completed, tested and calibrated, and is now a working instrument and performing well. The proton (ion) source, which was just started a year ago is nearly finished. The ultra-violet excitation equipment was in use for some time, and the luminescence of some tektite and meteoric samples was investigated. (Author)

AD-292 741 Div. 2, 6, 8, 25
(TISTE/CRJ) OTS price $1.60

Manchester U. (Gt. Brit.).
RESEARCH STUDY AND DEVELOPMENT OF 1 METRE-MIRROR FOR MOON TRACKING AND PHOTOGRAPHY.
Annual summary rept. no. 2,
by Zdenek Kopal. Mar 62, 8p.
(Contract AF 61(052)400)
(AFCRL 62-1100) Unclassified report

DESCRIPTORS: *Astronomy, *Telescopes, *Mirrors, *Optical tracking, *Photography, Crystal oscillators, Quartz crystals, Infrared radiation, Radiometers, Great Britain, Moon.

The optical equipment for the 43-inch telescope was delivered and installed at the Observatoire du Pic-du-Midi in November 1961. Extensive optical tests on the 43-inch mirror revealed the optical surface to be correct within ± lambda/20 over 90% of its effective arc; slightly larger deviations were encountered only within the last 7-cm of its free aperture. The first photographs of the Moon, secured with the aid of this mirror in a f/15 Cassegrain combination are of excellent quality and augur well for the future. The Secasi oscillator to control the drive of the 43-inch telescope was delivered and functions to specifications. The infra-red pyrometer for measurements of the lunar and planetary temperatures was designed and built in our laboratories at Manchester, and used during winter months for the studies of lunar temperature distribution in the neighbourhood of certain ray craters. The results revealed the crater floors to be cooler in daytime that their surroundings by several degrees. (Author)

AD-292 749 Div. 2
(TISTP/TL) OTS price $11.00

Air Force Cambridge Research Labs., Bedford, Mass.
ARCTIC EARTH SCIENCE INVESTIGATIONS CENTRUM SO, NORTHEAST GREENLAND, 1960,
ed. by Stanley M. Needleman. July 62, 132p. incl. illus. tables, 26 refs. (Air Force Surveys in Geophysics no. 138; AFCRL 62-695)
(Proj. 7628)
Unclassified report

DESCRIPTORS: *Arctic regions, *Earth, *Geology, Tests, Greenland, Airports, Rescues.

Since 1955, the Terrestrial Sciences Laboratory of Air Force Cambridge Research Laboratories has been investigating ice-free natural land areas in North and East Greenland (Arctic Terrain Research Project 7628) to obtain scientific data applicable to aircraft operation in the Arctic. The importance of such data arises from the need for emergency airstrips to serve as alternate sites for the few existing airfields. Increased air traffic over the Arctic, coupled with the extreme and often unpredictable weather conditions, frequently precludes the use of established airfields. (Author)

AD-292 763 Div. 2, 25
(TISTP/GRW) OTS price $1.60

Manchester U. (Gt. Brit.).
SPECTROPHOTOMETRIC STUDY OF THE LUNAR SURFACE.
Annual summary rept. no. 2,
by Zdenek Kopal. Mar 62, 9p. incl. illus. tables.
(Contract AF 61(052)378)
(AFCRL 62-1096) Unclassified report

DESCRIPTORS: *Moon, *Luminescence, *Spectrophotometers, Intensity, Polarization.

The instruments designed for the study of lunar luminescence as well as for the measurement of the polarization of moonlight were built in our laboratories at the University of Manchester, and their field use commenced both at the 50-inch reflector of Asiago Observatory of the University of Padua and the 15-inch refractor of the Wilfred Hall Observatory at Preston, Lancashire. Preliminary results of the reduction of observations do disclose the presence of an appreciable luminescent component in moonlight, amounting to a few percent of the total. There is, moreover, evidence on hand (though not yet definitive) that the amount of luminescence fluctuates both with the time and in frequency. (Author)

AD-292 767 Div. 2
(TISTP/GRW) OTS price $1.10

Naval Oceanographic Office, Washington, D. C.
OPERATION DEEP FREEZE 62 MARINE GEOPHYSICAL OBSERVATIONS.
Preliminary rept.
30 Oct 62, 6p. incl. illus. table (Serial no. 8532)
Unclassified report

DESCRIPTORS: *Hydrographic surveying, *Geophysics, Oceanographical data, Terrestrial magnetism, Bathythermograph data, Oceanographic vessels, Antarctic regions.

During the Austral Summer of 1961-1962, the US Naval Oceanographic Office (Formerly the U. S. Navy Hydrographic Office) conducted marine geophysical research in the true Antarctic. A broad program consisting of oceanography, bathymetry, and terrestrial magnetism was accomplished aboard USS BURTON ISLAND, while USCGC EASTWIND and USS GLACIER completed extensive oceanographic and bathymetric surveys. Underway observations included continuous total magnetic intensity recordings, hourly or half-hourly bathythermograph casts, continuous sonic soundings, continuous sea surface and air temperature recordings, and sea and swell (or ice) observations. Hove-to observations consisted of standard oceanographic stations, bottom sediment samples and surface plankton samples. (Author)

AD-292 913 Div. 2, 12
(TISTP/JW) OTS price $4.60

Max-Planck-Institut fuer Chemie, Mainz (Germany).
CHLORINE 36 AND ARGON 39 IN METEORITES AND THE EXPOSURE AND TERRESTRIAL AGES OF IRON METEORITES.
Final rept.,
by E. Vilcsek and H. Wanke. 1962, 43p. incl. tables, 41 refs.
(Contract AF 61(052)334)
(AFCRL 62-1092) Unclassified report

DESCRIPTORS: *Meteors, Chlorine, Argon, Deterioration, Cosmic rays, Exposure, Particles, Isotopes, Iron.

About 30 meteorites were analyzed. The decay rates of chlorine 36 varied between 0 and 28 dpm/kg; for argon 39, between 0 and 23 dpm/kg. Together with the argon 36 content we were able to calculate cosmic ray exposure ages of the meteorites analyzed. As already previously suspected, all the octahedrites, and mainly the medium octahedrites, show exposure ages of about 500 million years. Very large differences in the cosmic ray exposure ages were observed for the group of the hexahedrites. Problems about the orbits of the hexahedrites are discussed and special boundaries for their orbits were deduced from our measurements. It could be shown that the mean cosmic ray intensity during the last 300 years was the same as during the last 300,000 years. We looked for argon 39 in 21 different iron meteorites which were finds, and all of them, except Keen Mountain, showed no argon 39 activity. Lower limits for the terrestrial age between 1000 to 2000 years were calculated for these finds. For Keen Mountain meteorite the terrestrial age came out as about 1300 years. One meteorite, namely Tamarugal, showed also no chlorine 36 activity, indicating a terrestrial age of more than 1.5 million years. For Clark County meteorite we calculated a terrestrial age of 600,000 years. (Author)

AD-292 934 Div. 2
(TISTP/JW) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CATASTROPHIC GLACIER ADVANCES,
by Johannes Weertman. Sep 62, 8p. incl. illus. table, 11 refs. (Research rept. no. 102)
(DA Proj. 8566-02-001)
Unclassified report

DESCRIPTORS: *Glaciers, *Slides, Fluid flow, Liquids, Velocity, Melting, Motion.

A theory is developed to explain catastrophic glacier advances, based on a previously developed glacier sliding theory (Weertman, 1957). It is found that catastrophic sliding is possible when the thickness of the water layer at the bottom of a glacier exceeds the size of the obstacles which normally control the velocity of sliding. The conditions which appear to be necessary for catastrophic advances to occur are: (1) the glacier should be long (10 - 30 km) and its bottom surface should be at the melting point; (2) the water at the glacier bed should flow as a sheet of water with only negligible flow in stream channels; (3) an above-average shear stress (of the order of 2 bar) should act at the bed. Such an abnormal stress could be produced by the arrival of large kinematic glacier waves; and (4) the glacier bed should be smoother with respect to large protuberances and obstacles than to small hindrances. The theory can be applied to explain the rapidly fluctuating velocity changes observed in ordinary glaciers. Kinematic water waves in the water layer at the bottom of a glacier can produce rapidly changing fluctuations in the surface velocity of the glacier. (Author)

AD-292 935 Div. 2
(TISTP/JW) OTS price $3.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ELECTRICAL D-C RESISTIVITY MEASUREMENTS ON GLACIER ICE NEAR THULE, GREENLAND,
by Andrew U. Meyer and Hans Roethlisberger.
Oct 62, 34p. incl. illus. tables, 11 refs.
(Technical rept. no. 87)
(DA Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Glaciers, *Ice, Resistors, Greenland, Temperature, Density, Crystals, Electrical properties.

The results of electrical d-c resistivity measurements carried out at the surface of cold glaciers near Thule and on the firn of the Greenland ice sheet as well as inside excavations in glacier ice are reported. A resistivity of the order of 100 kilo-ohm-m was found in the firn at temperatures of about -24C and in glacier ice at about -12C, as opposed to values of many megohm-m in temperate glaciers as reported in the literature. An indication was obtained of considerably higher resistivities than 100 kilo-ohm-m in the ice of a long valley glacier and close to the bottom of thin glaciers with little movement. The interpretation in terms of ice thickness proved to be highly ambiguous, and the resistivity method was accordingly of little use for sounding purposes under the conditions encountered. Non-linear phenomena were observed with small electrode separations inside the excavations. Recommendations are made on the construction of a field instrument for measurements on glaciers or other high resistivity material. (Author)

AD-292 941 Div. 2, 9
(TISTP/JW) OTS price $4.60

Arizona U., Tucson.
TEMPERATURE FLUCTUATIONS AT A WETTING FRONT AND AN APPLICATION OF THE THEORY OF RATE PROCESSES TO WATER FLOW IN SOILS.
Annual rept.,
by Duwayne M. Anderson and Garrison Sposito.
Sep 62, 49p. incl. illus. tables, refs.
(Contract DA 36-039-sc-80581)
Unclassified report

DESCRIPTORS: *Soils, *Moisture, Fluid flow, Clays, Montmorillonite, Temperature, Water.

Several experiments to determine the apparent activation energies of the several processes contributing to water movement in soils and to develop a theory of soil water movement in terms of the molecular physics of the several contributing processes are reported. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-292 959 Div. 2, 9, 12
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
INVESTIGATION OF THE LOWER IONOSPHERE BY MEANS OF LONG RADIO WAVES AND LOW-FREQUENCY PROBES INSTALLED ON A ROCKET. DETECTION OF A NEW IONOSPHERIC LAYER,
by P. Ye. Krasnushkin and N. L. Kolesnikov.
21 Dec 62, 5p. incl. illus. 13 refs. (AID rept. no. 62-207; Trans. from Akademiye Nauk SSSR. Doklady, 146:3, pp. 596-599, 21 Sep 62)
Unclassified report

DESCRIPTORS: *Ionosphere, *Radio waves, Low frequency, Wave analysis, Partial differential equations, Translations, Boundary layer, Solar atmosphere, Dielectric properties, Semiconductors, Rocket research, Space probes.

AD-292 971 Div. 2
(TISTP/JW) OTS price $4.60

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
TESTS OF BASIC GEOMETRICAL QUALITIES OF PHOTOGRAMMETRIC PLOTTING INSTRUMENT,
by K. Bertil P. Hallert. 28 Aug 62, 39p. incl. illus. tables, 7 refs. (GIMRADA Research note no. 5)
Unclassified report

DESCRIPTORS: *Mapping, *Plotters, Numerical analysis, Geodesics, Photographic recording systems, Optics, Statistical distributions, Test methods, Instrumentation.

Some basic geometrical qualities of various photogrammetric plotting instruments were investigated. From grid-method tests of the interior orientation of different projectors, the basic geometrical quality of the reconstruction of bundles of rays was determined. Weight variations were determined, and the statistical distribution of residual errors was tested after comprehensive practical measurements. Numerical procedures for the determination and adjustment of certain regular errors in projectors with mechanical projection were derived and applied to practice. Significance tests were applied. Through y-parallax tests, some relations between varying image resolutions and geometrical quality were investigated in a superwide-angle plotter. Similar tests were also applied to two other instruments with optical projection. (Author)

AD-293 168 Div. 2, 1
(TISTP/JW) OTS price $3.60

Air Weather Service, Scott Air Force Base, Ill.
FORECASTING DENSITY ALTITUDE,
by Norman N. Richardson. Nov 62, 32p. incl. illus. tables (Technical rept. no. 165)
Unclassified report

DESCRIPTORS: *Weather forecasting, *Density, Pressure, Temperature, Meteorological data, Tables, Helicopters, Height finding.

AD-293 195 Div. 2
(TISTP/JW) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
RADIANT TEMPERATURE OF THE SKY AT HIGH ALTITUDE,
by H. T. Hammel. Dec 54, 4p. incl. illus. table, 2 refs. (Technical rept. AAL TR 63)
(Proj. 7-7951; In cooperation with Pennsylvania U.)
Unclassified report

DESCRIPTORS: *Temperature, *Radiation effects, Humidity, Vapors, Water, Energy, Measurement, High altitude.

AD-293 250 Div. 2, 6
(TISTW/DLW) OTS price $1.60

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Quarterly technical rept. no. 4, 1 July-30 Sep 62,
by E. A. Mueller, G. E. Stout, and William C. Ackermann. 30 Sep 62, 13p. incl. illus. tables.
(Contract DA 36-039-sc-87280)
Unclassified report

DESCRIPTORS: *Precipitation, *Radar echo areas, *Meteorological radar, Analysis of variance, Measurement, Cameras, Data processing systems, Meteorological data, Quantitative analysis, Functional analysis, Radar reflections, Raindrops.

The summer raindrop data collection at Mt. Withington, New Mexico, was undertaken and completed. The installation and data collection from the raindrop cameras in the east central Illinois area progressed satisfactorily. The computer program for processing of the data in an IBM 7090 computer was completed but not proven. A summary of the coalescence curve-fitting technique used for the Oregon raindrop data is presented along with the results obtained with its use. In general, the coalescence curve fitting was considerably better than expected considering the type of rain occurring at Oregon. (Author)

AD-293 421 Div. 2, 8
(TISTP/JW) OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
APPLICATION OF RADAR DATA TO FORECASTING OF TERMINAL WEATHER CONDITIONS.
Final rept.,
by Pauline M. Austin. Sep 62, 49p. incl. illus. tables, 2 refs.
(Contract AF 19(604)5220, Proj. 4641)
(AFCRL 62-1019) Unclassified report

DESCRIPTORS: *Precipitation, *Weather forecasting, Linear systems, Visibility, Measurement, Echo ranging, Data processing systems, Meteorological data, Radar.

A screening and regression technique was applied to 60 predictands and 120 possible predictors in more or less random positions within a range of 60 miles. Each station consisted of a five by five mile square. The investigation was based on records of selected storms which contained large precipitation areas and lasted several hours. It was found that for prediction times ranging from 10 to 240 minutes the use of 4 to 11 predictors selected by the screening process provided a mean reduction in variance which was considerably larger than that obtained simply by persistence or advection. The linear predictability of precipitation was shown to be relatively insensitive to reasonable variations in spatial density of data, but the spatial extent may be a critical parameter. The space resolution with which a forecast is made appears to influence to some extent the level of predictability. Comparison was made of the variations in precipitation rate as measured by radar with fluctuations in ceiling and visibility, recorded by rotating-beam ceilometers and transmissometers respectively at two airports which are located within a few miles of the radar site. It was found that the time scale of the variations is approximately the same for the three quantities, but the relationships between them differ for different storm types and geographical locations. (Author)

AD-293 427 Div. 2
(TISTP/JW) OTS price $3.60

New York U. Coll. of Engineering, N. Y.
THE AVERAGE HORIZONTAL WIND DRIVEN MASS TRANSPORT OF THE ATLANTIC FOR FEBRUARY AS OBTAINED BY NUMERICAL METHODS.
Technical rept.,
by D. M. Garner, G. Neumann, and W. J. Pierson, Jr. Dec 62, 35p. incl. illus. refs.
(Contract Nonr-28503)
Unclassified report

DESCRIPTORS: *Wind, *Numerical analysis, *Transport properties, Fluid flow, Motion, Climatic factors, Vortices, Meteorological data, Atlantic ocean.

The vorticity balance in the wind-driven circulation is examined using material that attempts to portray conditions in the Atlantic Ocean as closely as existing observations permit. The shape of the continental boundaries is considered, along with the depth of the layer of no motion, the observed mean wind field over the ocean, and appropriate sources and sinks on the boundaries. (Author)

AD-293 428 Div. 2, 15
(TISTP/JW) OTS price $13.50

New York U. Coll. of Engineering, N. Y.
SOME STUDIES ON THE OCEAN CIRCULATION,
by David M. Garner. Oct 62, 182p. incl. illus. tables, refs.
(Contract Nonr-28503)
Unclassified report

DESCRIPTORS: *Oceans, *Oceanography, Linear systems, Wind, Hydrodynamics, Equation, Geometry, Model tests.

This study is based on papers by H. U. Sverdrup, H. Stommel, and G. Neumann, which have examined analytically the properties of the vertically integrated wind-driven circulation in ocean models based on the linearized, steady-state hydrodynamic equations of motion. A critical review is offered of the fundamental principles on which these models were based, the progressive development of the vorticity balance theme which links these contributions being stressed, and several aspects of the material reviewed are chosen for further analysis. The model of Sverdrup describes the vertically integrated circulation in an ocean bounded only on its eastern side by a meridionally oriented coast. Dynamically, the model portrays a state of balance between the curl of the driving wind stress field (the anemographic vorticity) and the interaction between the responding circulation and the earth's rotation (the planetary vorticity). The geometry of the stream and integrated pressure functions which characterize the Sverdrup model for selected particular driving wind stress patterns is described, and a table is presented from which this geometry may be estimated in terms of a Fourier series approximation to a general driving wind stress. Sverdrup's rectangular Cartesian analysis is repeated in spherical coordinates to show the influence on the model of the convergence of meridians on a spherical earth. (Author)

AD-293 450 Div. 2, 15, 25
(TISTP/JW) OTS price $6.60

Army Electronic Research and Development Activity Huachuca, Fort Huachuca, Ariz.
NUMERICAL SOLUTION OF NONSTEADY SOIL MOISTURE TRANSFER, I,
by William D. Ohmstede. Oct 62, 75p. incl. illus. tables, 23 refs. (Rept. no. ERDAH-MET-2-63; Meteorological Research notes no. 3)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Soils, *Atmospherics, Model tests, Boundary layer, Fluid flow, Impedance, Stability, Numerical analysis, Moisture.

The results of a program of numerical analysis of nonlinear partial differential equations which describe nonsteady soil moisture transfer are presented. These results are intended for use in determining soil moisture transfer characteristics of the various soil types, when combined with experimental data. The mathematical model of nonsteady soil moisture transfer is developed into a form suitable for computation on a digital computer. A number of equation solutions are presented which have boundary and initial conditions analogous to those encountered in laboratory experiments with soil moisture extractors. A description is given of the procedures required to determine the soil moisture transfer characteristics using the numerical results and data acquired in laboratory experiments. It is concluded that the numerical results are a significant improvement over the linear theoretical solution which has been used up to this time in determining soil moisture transfer characteristics. Further, it is shown that, when there is significant impedance to flow in the membrane of the soil moisture extractor, considerable difficulty can be encountered in adequately determining the soil moisture transfer characteristics. (Author)

AD-293 451 Div. 2
(TISTP/JW) OTS price $7.60

New York U. Coll. of Engineering, N. Y.
WAVE SPECTRA ESTIMATED FROM WAVE RECORDS OBTAINED BY THE OWS WEATHER EXPLORER AND THE OWS WEATHER REPORTER (I),
by L. Moskowitz, W. J. Pierson, Jr., and E. Mehr. Nov 62, 1v. incl. illus. tables, 4 refs.
(Contract N62306-1042)
Unclassified report

DESCRIPTORS: *Weather forecasting, *Ocean waves, Numerical analysis, Spectrographic analysis, Meteorological data, Tables, Atlantic Ocean.

As a part of the problem of developing numerical wave forecasting procedures for the North Atlantic Ocean, selected sequences of the weather maps for the North Atlantic for which wave data were known to be available were studied in detail for the five year period beginning in April 1955 and ending in March 1960. Certain dates and times of observations were selected for a variety of reasons for study. For these dates and times, the National Institute of Oceanography provided copies of the wave records that were obtained by the OWS Weather Explorer and by the OWS Weather Reporter. In total, about 800 wave records were provided, and a complete spectral analysis is planned for about 400 of these records. This report is the first of a series of reports to present in tabular and graphical form the results of these analyses. The total number of spectra given is 114. (Author)

AD-293 470 Div. 2
(TISTA/GEC) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
RADIAL VIBRATIONS OF A GRAVITATING, ELASTIC SPHERE,
by J. P. Jones. 1 Nov 62, 25p. incl. illus.

table, 7 refs. (Rept. no. TDR-169(3230-11)TR-1)
(Contract AF 04(695)169)
(SSD TDR 62-196) Unclassified report

DESCRIPTORS: *Spheres, Vibrations, Earth models, Mathematical analysis, Oscillations, Frequency, Gravity, Deformation, Partial differential equations, Taylor series, Special functions, Elasticity.

An investigation was made of the radial vibrations of a gravitating, elastic sphere, using underformed Lagrangian coordinates. For simplicity, the Lame linear, elastic sphere was used as a model of the Earth. Nonlinear strain theory was used to set up the basic equation of motion although this equation is later linearized to obtain a solution. It was found that as a result of deformation, a gravitational instability occurs, wherein the gravitational forces build up more rapidly than the elastic restoring forces. The effect of gravity on the frequency of oscillation was found to reduce them. A possible unstable mode of oscillation was found to occur. (Author)

AD-293 603 Div. 2
(TISTP/JW) OTS price $1.10

DeNardo and McFarland Weather Service, Dravosburg, Pa.
AN OBJECTIVE METHOD FOR FORECASTING CEILING RESTRICTIONS DUE TO GULF STRATUS AT TINKER AIR FORCE BASE, OKLAHOMA.
Nov 59, 9p. incl. illus.
(Contract AF 11(623)279)
Unclassified report

DESCRIPTORS: *Cloud height indicators, *Weather forecasting, Stratus clouds, Visibility, Oklahoma.

AD-293 604 Div. 2
(TISTP/JW) OTS price $1.10

DeNardo and McFarland Weather Service, Dravosburgh, Pa.
AN OBJECTIVE METHOD FOR FORECASTING AIR MASS THUNDERSTORMS AT ROBINS AIR FORCE BASE, GEORGIA.
Oct 59, 8p. incl. illus.
(Contract AF 11(623)279)
Unclassified report

DESCRIPTORS: *Storms, *Weather forecasting, Air mass analysis, Visibility, Wind, Georgia.

AD-293 605 Div. 2
(TISTP/JW) OTS price $1.60

DeNardo and McFarland Weather Service, Dravosburg, Pa.
AN OBJECTIVE METHOD FOR FORECASTING NON FRONTAL LOG AT OTIS A.F.B. MASSACHUSETTS.
Oct 59, 17p. incl. illus.
(Contract AF 11(623)279)
Unclassified report

DESCRIPTORS: *Weather forecasting, *Fog, Visibility, Meteorology, Scattering, Analysis, Massachusetts.

AD-293 607 Div. 2
(TISTP/JW) OTS price $1.10

DeNardo and McFarland Weather Service, Dravosburg, Pa.
AN OBJECTIVE METHOD FOR FORECASTING STRONG AND GUSTY WINDS AT PLATTSBURGH AIR FORCE BASE, NEW YORK.
Nov 59, 9p. incl. illus, table
(Contract AF 11(623)279)
Unclassified report

DESCRIPTORS: *Wind, *Weather forecasting, Meteorology, Analysis, Surfaces, New York.

AD-293 673 Div. 2
(TISTP/FR) OTS price $2.60

RAND Corp., Santa Monica, Calif.
PHYSICAL PROPERTIES OF THE UPPER ATMOSPHERE,
by H. K. Kallmann. 12 May 52, 19p. incl. illus. tables, 7 refs. (Rept. no. RM-841)
Unclassified report

DESCRIPTORS: *Atmosphere, *Physical properties, Density, Particles, Temperature, Sound, Velocity, Viscosity, Molecules, Tables.

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-293 206 Div. 3
(TISTB/SAT) OTS price $1.60

Biological Labs., Frederick, Md.
REPORT ON THE STATUS OF AUTOMATIC AND CONTINUOUS WARNING EQUIPMENT AGAINST BIOLOGICAL WARFARE AGENTS IN THE AIR.
Dec 62, 9p. incl. illus. tables (Trans. no. 701 from Entwicklungsauftrag, pt. 3, 9 May 62)
Unclassified report

DESCRIPTORS: *Biological warfare agents, *Fluorescent dyes, *Acridines, Germany, Photomultipliers, Detection.

In a letter to the (German) Federal Office of Military Engineering and Procurement (Bundesamt fur Wehrtechnik und Beschaffung) the CAP Company reports on the status of their study of the differentiation between organic and inorganic particles by means of fluorochrome staining. It was found that the procedure described definitely makes it possible to clearly differentiate between talcum and yeast particles, with Acridine Orange being the most suitable fluorochrome for this purpose. (Author)

AD-293 269 Div. 3, 24, 8, 30
(TISTM/EJH) OTS price $1.10

Southern Research Inst., Birmingham, Ala.
(No title).
Monthly progress rept.,
by Alvin N. Bird, Jr. 9 Jan 63, 4p.
(Contract DA 18-108-AMC-32-A)
Unclassified report

DESCRIPTORS: *Aerosols, *V agents, *Television cameras, *Gas detectors, Image intensifiers (Electronics), Image tubes, Flash lamps, Electrochemistry, Instrumentation, Particles, Measurement, Design, Detection.

A detailed study of the aerosol-flash camera was started, and the equipment was assembled for the experimental work on the electrochemical detector. Four main components of the aerosol camera are: flash illuminator, objective lens, image intensifier tube, and the TV camera. The flash illuminator freezes the motion of the droplets as they pass through the field of view of the objective lens. The objective lens projects an image of the particles onto the photocathode of the image intensifier tube. The electron optics of the image tube produce a brightened image on the output phosphor screen of the tube. Through a relay lens the vidicon will view the image intensifier, and the output signal of the vidicon will contain particle size information. The use of the image intensifier tube and the sheet illuminator represent the main difference between our aerosol-flash camera and the spray particle analyzer. The source for the flash illuminator will be a high-speed, electronic flash lamp. Experimental work on the electrochemical cell continued. (Author)

4. CHEMISTRY

AD-291 971 Div. 4, 14
(TISTM/SJR) OTS price $1.60

Florida U., Gainesville.
THE SYNTHESIS OF UNSATURATED FLUOROCARBONS.
Quarterly rept. no. 45, 13 June-13 Sep 62,
by Paul Tarrant and Frank Pisacane. 13 Sep 62,
10p.
(Contract DA 19-129-qm-500, Proj. 7-93-15-004)
Unclassified report

DESCRIPTORS: *Fluorocarbons, *Elastomers, Nitroso radicals, Formamides, Methyl radicals, Aluminum compounds, Chlorides, Butadienes, Halocarbons, Butenes, Propenes, Allyl radicals, Bromocarbons, Chlorocarbons, Cyclobutenes, Acrylonitriles, Infrared spectroscopy, Nuclear magnetic resonance, Zinc, Ethylenes, Synthesis.

A study was made to develop the best preparative method for nitroso compounds by adding nitrosyl chloride to a fluoroolefin in the presence of AlCl3 and dimethylformamide in solution. The gas phase reaction of nitrosyl chloride with olefins in sunlight was investigated and nitroso compounds were obtained. A number of fluoroalkyl-nitroso compounds were reacted with butadienes to give oxazines. (Author)

AD-292 098 Div. 4, 14
(TISTM/SJR) OTS price $1.10

Florida U., Gainesville.
THE SYNTHESIS OF UNSATURATED FLUOROCARBONS.
Quarterly rept. no. 44, 13 Mar-13 June 62,
by Paul Tarrant and John Savory. 13 June 62,
10p.
(Contract DA 19-129-qm-500, Proj. 7-93-15-004)
Unclassified report

DESCRIPTORS: *Fluorocarbons, *Elastomers, *Allyl radicals, *Acrylic resins, Iodides, Halocarbons, Chlorocarbons, Nitrogen compounds, Oxides, Catalysts, Mercury, Ultraviolet radiation, Chromatographic analysis, Gases, Infrared spectroscopy, Nuclear magnetic resonance, Nitroso radicals, Mercury, Ethylenes, Synthesis.

CF2=CH-CF2NO and CF2=CF-CF2NO have been prepared in 24.5% and 34% yield respectively by reacting the corresponding polyfluoroallyl iodide with nitric oxide in the presence of mercury. Polyfluoroallyl chlorides and iodides react with nitrogen dioxide in the presence of mercury to give high yields of the corresponding polyfluoroacrylic acid fluorides. (Author)

AD-292 216 Div. 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASUREMENT OF THE VAPOR PRESSURE OF ALKALI METALS IN THE RANGE OF 10 TO THE -5TH POWER TO 10 TO THE -2ND POWER mm Hg,
by S. Ya. Lebedev and Yu. Ya. Stavisskiy.
30 Oct 62, 7p. incl. illus. 5 refs. (Trans. no. FTD-TT-62-1336 from Pribory i Tekhnika Eksperimenta, no. 1, pp. 142-144, 1962)
Unclassified report

DESCRIPTORS: *Alkali metals, *Cesium, *Potassium, *Sodium, *Lithium, Vapor pressure, Test equipment, Instrumentation, Surface area, Ionization, Tungsten, USSR.

An instrument for measuring the vapor pressures of alkali metals over the range of 10 to the -5th power to 10 to the -2nd power mm Hg is described. The operation of the instrument is based on the surface ionization of the alkali metal atoms on tungsten. The time constant of the instrument is approximately 10 to the -6th power sec. At the present time, the well-known dependence of the vapor tension of a metal upon thermostat temperature is used to determine the vapor pressures of the alkali metals. This method is applicable only in cases of complete equilibrium in the investigated system. In addition, the method has considerable inertia and cannot be used for continuous measurements. In a number of actual systems, continuous and low-inertia control of the vapor pressures of alkali metals is necessary. (Author)

AD-292 246 Div. 4, 7
(TISTM/RGR) OTS price $5.60

American Cyanamid Co., New York.
GENERATION OF HYDROGEN FOR FUEL CELLS IN SUBMARINE PROPULSION. PROCESSES INVOLVING DECOMPOSITION OF AMMONIA,
Oct 62, 1v. incl. illus. 13 refs.
(Contract NObs-86745, Proj. SF013-06-04)
Unclassified report

DESCRIPTORS: *Fuel cells, *Hydrogen, *Gas generating systems, *Ammonia, *Decomposition, Submarines, Thermodynamics, Production, Catalysts, Computer logic, Design.

Fuel cells are under study as sources of electrical power for submarines. At present only the hydrogen-oxygen cell is sufficiently advanced for consideration. Several processes are in industrial use for production of hydrogen, using various raw materials and methods. Any of these can be adapted for installation on a submarine. To meet requirements, we have prepared alternate process designs for using the decomposition of NH3 as a source of hydrogen. Our laboratories have conducted experiments to provide certain basic kinetic data and catalyst information; our high speed digital computers have been used to develop mathematical models; and our drafting facilities have constructed space models for our designs. Our study leads to the conclusion that one of the alternates is immediately available for firm design and installation. (Author)

AD-292 248 Div. 4, 25
(TISTM/TCG) OTS price $.75

Monsanto Research Corp., Dayton, Ohio.
THE INFRARED SPECTRA OF SOME ALDEHYDES BETWEEN 15 AND 35 MICRONS.
Final rept., Nov 61-June 62, on The Chemistry and Physics of Materials,
by J. V. Pustinger, Jr. and J. E. Katon.
Oct 62, 19p. incl. illus. 15 refs.
(Contract AF 33(616)8465, Proj. no. 7360)
(ASD TDR 62-862) Unclassified report

DESCRIPTORS: *Aldehydes, *Infrared spectroscopy, *Benzaldehydes, Aliphatic compounds, Organic compounds, Molecular structure, Ethylenes, Phenyl radicals, Chlorides, Nitro radicals, Methyl radicals, Spectrographic analysis, Chemical analysis.

Spectral data for 41 aldehydes have been recorded from 1/700 cm to 1/300 cm and analyzed for spectra-structure correlations. The information so attained can be applied in identifying aliphatic and aromatic aldehydes. Specific correlations were determined for aliphatic aldehydes with or without alpha-branching. Tentative correlations were observed for alpha-olefinic, alicyclic, and aromatic aldehydes. (Author)

Division 4 - CHEMISTRY

AD-292 249 Div. 4, 25
(TISTM/TCG) OTS price $.50

Monsanto Research Corp., Dayton, Ohio.
ANNUAL SUMMARY REPORT ON MOLECULAR STRUCTURE AND MATERIALS CHARACTERIZATION.
Final rept., 1 July 61-1 July 62 on the Chemistry and Physics of Materials,
by J. E. Katon. Nov 62, 9p. incl. illus. 8 refs.
(Contract AF 33(616)8465, Proj. no. 7360)
(ASD TDR 62-940) Unclassified report

DESCRIPTORS: *Organic compounds, *Molecular structure, *Polymers, Chemical analysis, Infrared spectroscopy, Ketones, Ethers, Alcohols, Aldehydes, Gravimetric analysis, Temperature, Polymerization, Molecular rotation, Butanes, Valeric acids, Methyl radicals, Cyclohexanes, Test methods, Mass spectroscopy, Synthesis.

Progress is reported in the determination of molecular structures, characterization of materials, and the development and application of various analytical techniques. This report summarizes the three research programs undertaken and the service functions performed. The three research projects, reported in detail in separate ASD reports, concern far infrared spectra-structure correlations of ketones, ethers, alcohols and aldehydes; spark source mass spectrometry of organic compounds; and application of thermogravimetric and differential thermal analysis techniques to the characterization of high temperature polymeric systems. (Author)

AD-292 616 Div. 4
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHLORINE AND HYDROGEN EXPLOSION TEMPERATURES AND LIMITS IN HYDROGEN CHLORIDE,
by T. I. Kunin and V. I. Serdyukov. 21 Nov 62, 11p. incl. illus. tables, 2 refs. (Trans. no. FTD-TT-62-1415 from Zhurnal Obshchey Khimii, 16:9, pp. 1421-1430, 1946)
Unclassified report

DESCRIPTORS: *Hydrogen, *Chlorine, *Explosive gases, *Hydrochloric acid, Mixtures, Chemical reactions, Temperature, Oxygen, Nitrogen, Carbon dioxide, Explosives, Igniters, Sparks, Electric discharges, USSR, Explosions.

An investigation was made of the limits of explosion of Cl-H mixtures in a medium of HCl and of the effect of admixtures of CO2, N2, O2 and water vapor on the change of the explosive properties. The experiment basically is devoted to the study of the explosive properties of the HCl + H2 + Cl2 system. (Author)

AD-292 618 Div. 4, 17, 30
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ANALYSIS OF GASES AND METALS (SELECTED ARTICLES).
25 Oct 62, 13p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-1338 from Analiz Gazov V Metallakh, Akademiya Nauk SSSR. Komissiya Po Analiticheskoy Khimii. 10, pp. 91-96 and 117-121, 1960)
Unclassified report

DESCRIPTORS: *Alkali metals, *Metals, *Alloys, *Gases, Liquid metals, Oxygen, Hydrogen, Test methods, Solvent extraction, Vacuum apparatus, Mercury, Peroxides, Sodium, Eutectics, Oxides, Sampling, Chemical impurities, Chemical analysis.

Several methods are known for detecting oxygen in alkali metals. These methods can be divided into two groups. In one they are based on the detection of water formed as a result of the reaction of O in the alkali metal with different reagents; in the other by the detection of O in the alkali metal by one or another means. One method is to treat the alkali metal with dry HCl at high temperature. Another is based on the use of glacial acetic acid. For successfully determining the content of O and H in alkali heat carriers, the method of vacuum extraction is described. (Author)

AD-292 627 Div. 4, 25
(TISTM/TCG) OTS price $.50

Battelle Memorial Inst., Columbus, Ohio.
FREQUENCY ASSIGNMENTS OF BENZENE DERIVATIVES IN THE CESIUM BROMIDE REGION.
Rept. for 1 Mar-3 July 61,
by R. J. Jakobsen. Oct 62, 15p. incl. illus. 36 refs.
(Subcontract to Cincinnati U., Ohio, Contract AF 33(616)7450)
(ASD TDR 62-895) Unclassified report

DESCRIPTORS: *Benzenes, *Molecular structure, *Infrared spectroscopy, Substitution reactions, Decomposition, Deformation, Halides, Nitro radicals, Aldehydes, Carbonyl radicals, Ethyl radicals, Butyl radicals, Methyl radicals, Amides, Frequency.

Frequency assignments in the CsBr spectral region (1/650 to 1/250 cm) were made from the spectra of 279 benzene derivatives. The Raman spectra of 119 of these compounds were also available and were used as aids in making the assignments. The assigned frequencies include several benzenelike ring deformations and some vibrations that are either internal vibrations of the substituent group or involve the ring-substituent bond. A variation in frequency with symmetry or substitution type (ortho, meta, para, etc.) was found for the ring deformations. Within a given substitution type certain of the ring-deformation vibrations were found to be sensitive to substituent effects. The assigned frequencies involving the substituent group can be classified as characteristic frequencies of benzene compounds with a particular substituent. (Author)

AD-292 663 Div. 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SYNTHESIS OF ORGANOSILICON MONOMERS WITH NITRILE GROUPS,
by A. D. Petrov, Ye. P. Zakharov and others.
26 Oct 62, 9p. incl. tables, 8 refs. (Trans. no. FTD-TT-62-1260 from Zhurnal Prikladnoy Khimii, 35:2, pp. 385-389, 1962)
Unclassified report

DESCRIPTORS: *Metalorganic compounds, *Silanes, *Silicon compounds, Nitriles, Chemical reactions, Cyclohexenes, Cyano radicals, Butyl radicals, Peroxides, Catalysts, Infrared spectroscopy, Molecular structure, Chlorides, Methyl radicals, USSR, Synthesis.

For the purpose of obtaining new organosilicon monomers with nitrile groups, the addition of Cl3SiH to cyclohexene-3-carbonitrile was studied. The best results in the addition of trichlorosilane to cyclohexenecarbonitrile were obtained when tertiary butyl peroxide was used as a catalyst. The use of IR spectra for the identification of the addition products did not give positive results. Considerable amounts (up

to 60-90%) of $SiCl_4$ formed attests to the disproportionation of $HSiCl_3$ under the action of nitrogen-containing compounds present in the reaction mixture. (Author)

AD-292 922 Div. 4
(TISTM/ODN) OTS price $1.60

Naval Research Lab., Washington, D. C.
A FORCE-AREA STUDY OF MIXED FILMS OF CATALASE AND OVOMUCOID,
by J. D. Bultman and J. M. Leonard. 5 Dec 62, 9p. incl. illus. tables, 21 refs. (Rept. no. NRL rept. 5857)
Unclassified report

DESCRIPTORS: *Films, *Enzymes, *Monomolecular films, Egg white, Surface area, Proteins, Catalase, Physical properties, Chemical properties, Surface properties, Pressure, Molecules, Sulfates, Ammonium radicals, Inhibition.

An investigation of the surface chemical behavior of the enzyme-inhibitor complex between ovomucoid and catalase was undertaken. Monomolecular films of this complex were deposited on substrate solutions of ammonium sulfate at pH 4.0 and pH 7.0. Spreading solutions of several molecular ratios were employed. Force-area (F-A) curves for these films showed two inflections corresponding to different orientations of the film molecules and were similar in general shape to those obtained from films of the separate constituents. The force-area data were analyzed according to the method of Payens to determine the relation between the apparent molecular area of the complex and that which would be expected assuming no molecular interaction occurred between the two film components. This analysis indicated no evidence that molecular interaction was accompanied by an area change. Since such an interaction is known to take place, it is concluded that either the area occupied by the complex in the film is the sum of the areas of the separate components, or that the complex is so weakly bound that the spreading forces are sufficient to rupture the intermolecular bonds. (Author)

AD-292 931 Div. 4
(TISTM/EJH) OTS price $1.25

Aerospace Corp., Los Angeles, Calif.
FUNDAMENTAL IDEAS OF POLYMER CHEMISTRY,
by M. T. O'Shaughnessy. 30 Oct 62, 39p. incl. illus. tables, 8 refs. (Rept. no. TDR-69(2240-54)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-118) Unclassified report

DESCRIPTORS: *Polymers, *Polymerization, Copolymerization, Molecular structure, Physical properties, Mechanical properties, Electrical properties, Elasticity, Viscosity, Thermosetting resins, Crystallization, Rubber, Plastics, Chemistry.

A brief and general survey of the chemistry and physical chemistry of high polymers is presented, with chief emphasis on linear polymers. Topics discussed include: the synthesis of addition polymers and condensation polymers, copolymerization, stereospecific synthesis, molecular weight and its determination, the phenomenon of high elasticity and its molecular mechanism, linear viscoelastic behavior as a function of temperature, crystallinity and orientation, and electrical properties. Highly cross-linked thermosetting resins are discussed very briefly, despite their relatively great importance for high strength and high temperature applications, because they do not exemplify, as well as do linear polymers, the fundamental chemical and physicochemical features which distinguish polymers from other types of materials. (Author)

AD-293 220 Div. 4
(TISTM/REB) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
FURTHER STUDIES OF DETERGENCY,
by A. Mankowich. 19 Nov 62, 15p. incl. tables. (Rept. no. CCL 133)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Detergents, Test methods, Mathematical analysis, Soils, Cleaning, Fatty acids, Alcohols, Esters, Amines, Surface properties.

Further study of the proposed detergency (D) - micellar solubilization (S) function, D equals K sub i S plus K sub 2, centered around the connection of the constants K sub 1 and K sub 2 to physicochemical factors of soil and surfactant, has resulted in establishing K sub 1 and K sub 2 relationships for 4-point (4 surfactants-1 soil, and 4 soils - 1 surfactant) and 5-point (5 surfactants - 1 soil) systems. The constants appear to be related to physical, and not random, parameters. Trends in the derived K sub 1 and K sub 2 relationships are (a) K sub 2 values of both multi-surfactant and multi-soil systems are functions of Antonow's interfacial tension, (b) K sub 1 values of multi-surfactant systems are connected to surfactant HLB, while K sub 1 values of multi-soil systems are connected to soil dipole moment, (c) prevalence of trigonometric functions especially in 5-point systems. (Author)

AD-293 265 Div. 4, 25
(TISTM/RGR) OTS price $2.60

Raytheon Co., Waltham, Mass.
THE ADSORPTION OF OXYGEN ON GALLIUM ANTIMONIDE.
Scientific rept. no. 3 on Investigation of Effects of Ion-Induced Defects on Surface Reactions,
by D. Shooter. 19 Oct 62, 19p. incl. illus. 21 refs. (Rept. no. S-480)
(Contract AF 19(604)8004)
(AFCRL 62-924) Unclassified report

DESCRIPTORS: *Adsorption, *Oxygen, *Gallium compounds, Intermetallic compounds, Crystals, Microbalances, Surfaces, Cleaning, Ion bombardment, Lattices, Antimonides.

Oxygen adsorption has been measured on the crystal faces of GaSb. A quartz microbalance enclosed in an ultrahigh vacuum system was used to measure the oxygen uptake. Weight changes of 4 x 10 to the -8th grams (5% of total absorption) could be detected. Prior to each experimental run the crystal surface was made atomically clean by ion bombardment. At oxygen pressures between 10 to the -7th and -6th torr, adsorption proceeded readily with the rate gradually decreasing to zero. Adsorption rates could be represented by the equation $\ln (1 - W/W_{\infty}) = Kpt$, where p is the pressure and W the weight adsorbed. The total amount adsorbed was independent of the pressure. A difference in both the rate of adsorption and the extent of adsorption on crystal faces was observed. (Author)

AD-293 436 Div. 4, 15, 25, 30
(TISTM/PCR) OTS price $4.60

Polymer Research Inst. U. of Mass., Amherst.
THE INTERNAL FIELD AND THE ADDITIVITY OF BOND POLARIZABILITIES.
Progress rept. no. 1, 1 Oct 61-29 Nov 62,

by Richard S. Stein and Robert L. Rowell.
29 Nov 62, 42p. incl. illus. tables, 13 refs.
(Technical. rept. no. 40)
(Contract Nonr-335701, Proj. NR 356-378)
Unclassified report

DESCRIPTORS: *Chemical bonds, *Polarization, Mathematical computer data, Dipole moments, Theory, Electrostatics, Differential equations, Matrix algebra, Programming, Simultaneous equations, Computers, Tables, Mathematical analysis.

Contents:
Elements of the Silberstein Theory
General approach to the interaction between bonds
General application of theory - a computer program
Results of calculations
FORTRAN program for internal field coefficients flow diagram

AD-293 446 Div. 4
(TISTM/EJH) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
THE ELECTROREDUCTION OF AROMATIC NITRO COMPOUNDS IN NONAQUEOUS SOLUTIONS. PART I. THE REDUCTION OF NITROBENZENES IN ACID LIQUID AMMONIA SOLUTIONS,
by W. S. Harris and G. B. Matson. 1 Dec 62, 27p. incl. illus. 10 refs.
(Wep Task R360 FR-104/211-1/R011-01-001)
(NAVWEPS rept. no. 7241) Unclassified report

DESCRIPTORS: *Nitrobenzenes, *Reduction, *Cathodes (Electrolytic cells), Nitro radicals, Nitroso radicals, Azo radicals, Hydroxides, Amines, Hydrazines, Phenyl radicals, Benzenes, Solutions, Acids, Ammonia, Electrochemistry, Thiocyanic acid, Mercury.

Aromatic nitro compounds, useful as cathodes in batteries, were reduced at a low-rate by using a mercury cathode in acid liquid ammonia solutions. The resultant data provide a reaction scheme for nitrobenzene in acid liquid ammonia. The end product of this reduction is phenylhydroxylamine. For nitroso-, azoxy-, or azobenzene the end product is hydrazobenzene. Analogously m-bis-hydroxylamino benzene is the end product of reduction of m-dinitrobenzene. Substituents were found to influence markedly the path and end products of reduction. Contrasted to m-dinitrobenzene, the ortho and para compounds are completely reduced to the amines. This method of low-rate reduction, as used to establish the reaction scheme, is also believed to be a practical method of screening aromatic nitro compounds for use as cathodes in batteries. (Author)

AD-293 463 Div. 4
(TISTM/ODN) OTS price $3.60

Illinois U., Urbana.
EFFECTS OF ADSORBED FILMS OF CAMPHOR AND THYMOL ON KINETICS OF THE TITANIUM (IV)-TITANIUM (III) ELECTRODE REACTION.
Final technical rept. on Surface and Interface Phenomena of Matter,
by H. A. Laitinen, K. Eda, and M. Nakanishi.
Sep 62, 27p. incl. illus. tables, 13 refs.
(Contract AF 33(616)5446, Proj. 7022)
(ARL 62-439) Unclassified report

DESCRIPTORS: *Adsorption, *Electrodes, *Camphors, *Titanium, Oxidation-reduction reactions, Films, Impedance, Penetration, Voltage, Electrostatic capacitance, Wetting agents, Resistance, Electrochemistry, Mercury electrodes, Electrolytic cells, Reaction kinetics.

The adsorption of camphor and thymol on a dropping mercury electrode was determined from capacitance measurements. A comparison was made of the electrode coverage as calculated from differential and integral double layer capacity, and the magnitude of the error caused by using differential capacity calculations was estimated. (Author)

AD-293 466 Div. 4
(TISTM/RGR) OTS price $5.60

Aerospace Information Div., Washington, D. C.
ORGANOSILICON AND ORGANOMETALLIC COMPOUNDS. ANNOTATED BIBLIOGRAPHY (PRELIMINARY).
31 Dec 62, 56p. (AID rept. no. 62-196)
Unclassified report

DESCRIPTORS: *Metalorganic compounds, *Bibliography, Silicon compounds, Magnesium compounds, Germanium compounds, Lithium compounds, Sodium compounds, Potassium compounds.

5. COMMUNICATIONS

AD-291 990 Div. 5, 6, 8
(TISTW/PCR) OTS price $2.60

Navy Electronics Lab., San Diego, Calif.
UNDERWATER COMMUNICATIONS SET AN/UQC-1(XG-1),
by Fred D. Parker and David A. Baldwin.
28 Sep 62, 25p. incl. illus. (NEL rept. no. 1139)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Underwater communication systems, *Sonar equipment, Transistors, Transducers, Electronic circuits, Handbooks, Specifications, Power supplies, Piezoelectric transducers, Ceramic materials, Piezoelectric crystals, Sonar, Sonar receivers, Sonar signals, Wiring diagrams, Band-pass filters, Frequency dividers, Audio amplifiers, Power amplifiers.

The AN/UQC-1(XG-1) general-purpose underwater communications set was developed based on Navy Electronics Laboratory (NEL) designed equipment of this type used with the bathyscaph TRIESTE. The AN/UQC-1(XG-1) is compatible with and capable of replacing the present standard AN/UQC-1 sonar. It offers the following advantages over the AN/UQC-1: improved efficiency; greater range; reduced weight, size, and power consumption; and simplified maintenance.

AD-291 999 Div. 5
(TISTE/CAM) OTS price $12.00

Bell Telephone Labs., Inc., Whippany, N. J.
UNICOM. UNIVERSAL INTEGRATED COMMUNICATION SYSTEM.
Quarterly progress rept. nos. 12-13, 1 Apr-30 Sep 62.
30 Sep 62, 158p. incl. illus.
(Contract DA 36-039-sc-78806, Proj. 3-55-00-200; In cooperation with ITT Labs., Nutley, N. J. and Radio Corp of America, New York)
Unclassified report

DESCRIPTORS: *Communication systems, *Military communications, *Voice communications, *Telephone communications, *Radio communications, *Data transmission systems, *Facsimile com-

munication systems, *Teletype systems, Management engineering, Panel boards (Electricity), Facsimile transmission, Coding, Data storage systems, Errors, Programming, Simulation, Switching circuits, Radio signals, Modulation, Standards, Digital systems, Analog systems, Analog-to-digital converters, Model tests, Logistics, Maintenance, Installation.

Work continued on the refinement of user needs and the coordination of solutions for problems extending over more than one subsystem. The need for a register recall feature was defined and user evaluation tests of the UNICOM user control set have been initiated. A study is completed on system implications of degraded transmission conditions. In the Network Planning area, an initial plan is complete for system control, which is organized in a distributed manner with each switching center making decisions based on information about the entire network. A digital-computer program simulating the system control process in a network of switching centers is complete; debugging and initial testing are underway. Simulations are complete for alternate routing of direct and indirect traffic, use of automatic retrieval for direct traffic, and use of trunk reservation for high-precedence traffic. In Switching and Signaling areas, switching requirements are prepared. (Author)

AD-292 094 Div. 5
(TISTE/PAR) OTS price $3.60

National Cash Register Co., Dayton, Ohio.
HIGH FREQUENCY DIGITAL COMMUNICATION SYSTEM.
Quarterly engineering rept. no. 6, 1 Sep-30 Nov 62.
30 Dec 62, 27p. incl. illus. refs. (NCR rept. no. 3-6Q)
(Contract AF 33(600)42197)
Unclassified report

DESCRIPTORS: *Digital systems, *Data transmission systems, *Military communications, Digital computers, Electronic circuits, Test equipment, Tests, Frequency modulation, Computer logic, Ground support equipment, Transmitter receivers, Communication systems, High frequency, Air to surface, Frequency shift keyers, Transistors, Transistor amplifiers, Semiconductors, Medium frequency, Aircraft equipment.

The development of special modulation, demodulation, digital coding, and control equipment for a high-frequency digital communication system that provides highly reliable operation under adverse conditions of multipath propagation and Doppler shift is discussed. Technical information describes the design and operation of circuits required for service-test model. Schematic diagrams of these circuits are included. The system was given a complete checkout using an ARC-58 transceiver as the transmitter for the ground station equipment and an ARC-65 transceiver as both receiver and transmitter for the airborne station equipment. (Author)

AD-292 097 Div. 5, 8
(TISTE/OHD) OTS price $5.60

Motorola, Inc., Chicago, Ill.
SOLID STATE ANALOG SWITCHING MATRIX FOR ELECTRO-LUMINESCENT DISPLAY.
Interim rept.,
by Augusten Ondrusek. 26 July 62, 64p. incl. illus. (Rept. no. CR-621)
(Contract AF 30(602)2480, Proj. 4530-556-00)
(RADC TR 62-412) Unclassified report

DESCRIPTORS: *Display systems, *Switching circuits, *Indicator lights, Luminescence, Semiconductors, Transistors, Diodes, Sweep generators, Electronic circuits, Wiring diagrams, Voltage dividers, Mathematical analysis.

Effort was expended on an investigation to prove the feasibility of an analog x-y input switching circuit to drive electro-luminescent and other display devices using the concept of crossed biased pn junctions. To verify the concept of the cross biasing technique, a lumped parameter (transistors, resistors, diodes and lamps) model of a solid state switching circuit was developed. The primary objective of this investigation was to perfect the ''cross biasing'' technique and obtain reasonable resolution in a one hundred lamp 10 x 10 display. To further the understanding of the cross bias technique, a mathematical analysis of the lumped parameter model is required. The qualitative and quantitative information obtained from the mathematical analysis will be used in the design of the solid state equivalent of the lumped parameter switching matrix. (Author)

AD-292 119 Div. 5, 8
(TISTE/OHD) OTS price $2.60

New York U., Coll. of Engineering, N. Y.
FEEDBACK COMMUNICATION SYSTEMS.
Summary scientific rept. for 14 Nov 62,
by Leonard S. Schwartz. 14 Nov 62, 20p. 26 refs.
(Contract AF 19(604)6168, Proj. 4610)
(AFCRL 62-921) Unclassified report

DESCRIPTORS: *Feedback, *Communication systems, *Communications theory, Coding, Pulse communication systems, Signal-to-noise ratio, Errors, Corrections.

The contents of eleven scientific reports are described. Most of the work is included in one of three categories: (1) the theory and development of coded error-free feedback communication systems; (2) signal theory, with particular emphasis on application to feedback communications; and (3) evaluations and analyses of communication system performance. Some promising areas for future research are also given. (Author)

AD-292 176 Div. 5, 30
(TISTE/OHD) OTS price $2.60

Navy Electronics Lab., San Diego, Calif.
PREDICTED AND MEASURED RELIABILITY INDEX OF RADIO SET AN/URC-32.
Research and Development rept.,
by W. A. Daigle. 31 Oct 62, 26p. incl. illus. tables, 6 refs. (Rept. no. 1143)
Unclassified report

DESCRIPTORS: *Radio equipment, *Radio receivers, *Radio transmitters, *Reliability, Test methods, Tests, Temperature, Voltage, Filaments, Cathodes (Electron tubes), Power amplifiers, Medium frequency, High frequency.

Two methods were used to predict the reliability index of radio set AN/URC-32. The two methods of predicting equipment failure rates are basically similar. Each employs part failure rates in its calculations, weighted by such contributing factors as overstressed, defective, or misapplied parts; faulty workmanship; interaction of stresses; and others not directly determined. Thus the final estimate of equipment failure takes into account conditions which could occur under field operating conditions. Before making the predictions, it was necessary to determine the level of various stress factors for a number

of parts. The levels used were the same as those produced under the reliability test conditions. About 958 electrical measurements were made, in addition to measurements of temperature of 60 different areas within the AN/URC-32. Some 2383 electrical and hardware parts in the AN/URC-32 were considered in the assignment of part failure rates. (Author)

AD-292 195 Div. 5, 7, 26, 30
(TISTE/OHD) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REMOTE MONITORING AND CONTROL APPARATUS FOR SYSTEMS WITH DISPERSED OBJECTS,
by Ye. V. Babicheva. 12 Oct 62, 30p. incl. illus. table, 2 refs. (Trans. no. FTD-TT-62-1042 from Promyshlennaya Telemekhanika, pp. 218-235, 1960)
Unclassified report

DESCRIPTORS: *Telemeter systems, *Telemetering, *Remote control systems, *Monitors, Translations, USSR, Instrumentation, Potentiometers, Data transmission systems, Multiplex transmission, Pressure transmitters, Temperature sensitive elements.

AD-292 966 Div. 5, 8, 12
(TISTE/OHD) OTS price $5.60

RCA Defense Electronic Products, Camden, N. J.
FUTURE ASTRO-COMMUNICATION TECHNIQUES.
Final rept., Mar 61-Oct 62,
by J. M. Brumbaugh, J. Vollmer, and L. W. Zelby. Oct 62, 46p. incl. illus. 25 refs.
(Contract AF 30(602)2151, Proj. no. 4519)
(RADC TDR 62-524) Unclassified report

DESCRIPTORS: *Cerenkov radiation, *Communication systems, *Microwave communication systems, *Space environmental conditions, Electron beams, Traveling wave tubes, Analysis, Electromagnetic waves, Partial differential equations, Dielectrics, Electromagnetic fields, Microwave amplifiers, Theory, Radiofrequency power, Mathematical analysis, Vacuum systems, Electron guns, Measurement.

Work performed during a study of future astro-communications techniques is reported. This work included a theoretical analysis of Cerenkov power generation for various beam geometries, rigorous derivation of nonresonant regeneration conditions in a circular cylindrical reaction structure, analysis of efficiency with and without the utilization of a potential well, and a general analysis of the Cerenkov effect and its relation to the Roentgen current. The experiment arrangement and techniques are described and measurements of observed Cerenkov radiation and velocity dispersion are reported. (Author)

AD-293 416 Div. 5
(TISTE/CRJ) OTS price $5.60

General Dynamics/Electronics, Rochester, N. Y.
AN/GRC-106 DESIGN PLAN III USER TEST MODELS OF RADIO SET AN/GRC-106. VOLUME II.
31 Aug 62, 1v. incl. illus.
(Contract DA 36-039-sc-90791)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Transmitter receivers, Sidebands, Power amplifiers, Costs, Radiofrequency amplifiers, Radio interference, Impedance.

AD-293 452 Div. 5, 6, 12
(TISTE/CRJ) OTS price $5.00

Philco Corp., Blue Bell, Pa.
STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING OF OPTICAL COMMUNICATION SYSTEMS.
Final rept. for 1 June 61-30 June 62,
by R. F. Anderson. Nov 62, 327p. incl. illus. tables, refs. (Rept. no. 9036-F)
(Contract AF 33(616)8392, Proj. 4335)
(ASD TDR 62-733) Unclassified report

DESCRIPTORS: *Light communication systems, *Optical tracking, *Satellite vehicles, *Spaceships, *Lunar probes, Numerical analysis, Lasers, Communication systems, Orbital flight paths, Air to air, Photomultipliers, Communication equipment, Airborne, Solar energy, Satellite attitude, Star trackers, Analog computers, Control systems, Space environmental conditions, Mathematical analysis, Probability, Communications theory, Solar systems, Stars, Image tubes, Sun, Signal-to-noise ratio, Errors, Interference.

Acquisition and tracking as applied to representative optical communication systems are studied. The two hypothetical communication links considered were between an earth-orbiting satellite and a moon-orbiting satellite, and between an earth-orbiting satellite and a cislunar space vehicle. The results show that acquisition and tracking are feasible. The study includes a typical system design based on the use of a laser communication transmitter. This subsystem utilizes a five-motor gimbal configuration which mounts the optical systems and sensors that perform the far-body tracking function and the acquisition and tracking of the communication beam. An image tube is used as the acquisition sensor in order to obtain high scanning rates. The tracking sensor design is based on state-of-the-art star trackers and utilizes a multiplier phototube. (Author)

6. DETECTION

AD-291 958 Div. 6, 12, 8
(TISTW/PCR) OTS price $2.60

Defense Research Lab., U. of Texas, Austin.
FACTORS CURRENTLY INFLUENCING RMS ERROR IN DOPPLER DATA,
by J. R. Wright. 1 Nov 62, 19p. illus. tables.
(Rept. no. DRL-477; APL rept. no. CF-2992)
(Contract NOrd-16498)
Unclassified report

DESCRIPTORS: *Satellite vehicles, Errors, Doppler tracking, Doppler radar, Signal-to-noise ratio, Antennas, Motion, Refraction, Oscillators, Satellite vehicle trajectories, Doppler systems.

Estimations are made of the relative importance of the various factors influencing rms doppler errors in TRANSIT satellite data. It is concluded, in general, that for low elevation passes (below 15 degrees) station errors predominate, while for higher elevation passes (above 25 degrees), orbital and refraction errors predominate. (Author)

AD-291 982 Div. 6
(TISTW/RD) OTS price $4.60

Michigan U., Ann Arbor.
ON THE DETECTION OF A RANDOMLY DISTORTED SIGNAL IN GAUSSIAN NOISE,
by L. Halsted, T. G. Birdsall, and L. W. Nolte. Oct 62, 38p. incl. illus. 8 refs. (Technical rept. no. 129; Rept. no. 3674-2-T)
(Contract Nonr-122436)
Unclassified report

DESCRIPTORS: *Radio receivers, *Signal to noise ratio, *Radio signals, *Detection, Noise (Radio), Radio interference, Mathematical analysis, Distortion.

The problem considered is that of designing a likelihood ratio receiver for detection of a signal that has been distorted by a randomly varying transmission loss and subsequently masked by an additive Gaussian noise. A general likelihood ratio receiver design was found whose form was the same for a wide class of random multipliers which includes the Pearson Type III, Rayleigh, and truncated Gaussian distribution. The optimum receiver was evaluated for the two-input-samples case using a digital computer. The results reinforced theoretical work which indicated that the effect of the multiplicative noise could be minimized by spreading the signal energy equally among the samples. Various facets of the performance of two nonoptimum receivers, the crosscorrelator and the clipper crosscorrelator, were also evaluated using the computer. (Author)

AD-292 048 Div. 6, 30, 8
(TISTW/JEA) OTS price $13.50

Packard-Bell Electronics Corp., Los Angeles, Calif.
RADAR TEST SET AN/APM-123 () AND RADAR TEST SET TS-1314()/U.
Final rept., 8 Aug 60-22 July 62,
by C. F. Deininger. 22 July 62, 180p. tables. (Rept. no. 10451-4)
(Contract DA 36-039-sc-85185)
Unclassified report

DESCRIPTORS: *Radar equipment, *Test sets, *Aircraft traffic control systems, *Reliability, Power supplies, Antenna amplifiers, Design, Transistors, L band, Frequency multipliers, Cavity resonators, Video amplifiers, Printed circuits, Analysis, Failure (Mechanics), Manufacturing methods, Delay circuits, Semiconductors, Pulse amplifiers, Pulse transmitters, Switching circuits, Stresses, Electronic integrators, Radiofrequency attenuators, Electron multipliers, Temperature, Airborne, Coding, Radar transmitters, Microwave equipment, Radar beacons.

The purpose of this research is to develop and produce two engineering test models of Radar Test Set AN/APM-123(XC-1), eight service test models of Radar Test Set AN/APM-123(XC-2), two engineering test models of Radar Test Set TS-1314(XC-1)/U and eight service test models of Radar Test Set TS-1314(XC-2)/U. Radar Test Set AN/APM-123( ) is designed to preflight-test the response signal characteristics of Transponder Set AN/APX-44 when the transponder is installed in an aircraft. Radar Test Set TS-1314( )/U is designed to convert the AN/APM-123( ) into a bench tester for the AN/APX-44. (Author)

AD-292 113 Div. 6
(TISTW/DLW) OTS price $3.60

Airborne Instruments Lab., Mineola, N. Y.
INTERFERENCE BLANKER GROUP AN/GPX-27( )., Rept. for Dec 59-Apr 61,
by Paul G. Holcombe. Sep 62, 1v. incl. illus. tables (Rept. no. 7318-1)
(Contract AF 30(635)14792)
(RADC TDR 62-521) Unclassified report

DESCRIPTORS: *Radar interference, *Video signals, *Identification systems, *Storage tubes, Radiofrequency filters, Electronic circuits, Reliability, Maintenance, Design, Tests, Reduction, Interference, Radar beacons, Display systems.

The development is described of the AN/GPX-27 interference blanker or defruiting equipment that uses storage tubes to eliminate unwanted nonsynchronous signals from radar beacon video replies. The interference blanker group functions as follows. The incoming video from the beacon receiver is threshold clipped to reduce noise, limited, and applied to the coincidence detector. The thresholded video is applied to the storage tubes where the video is held until the next range timing period. The readout video from the storage tubes is amplified and applied to the second grid of the coincidence detector. The synchronous video output from the coincidence detector is amplified and fed, through a cathode follower, to the system video output jack. (Author)

AD-292 116 Div. 6, 12, 15, 19
(TISTW/PCR) OTS price $1.60

White Sands Missile Range, N. Mex.
CARTESIAN VELOCITY AND ACCELERATION FROM RANGE-ONLY DATA,
by R. E. Green and W. L. Shepherd. Nov 62, 8p. incl. illus. (Technical rept. no. SELWS-E-106)
Unclassified report

DESCRIPTORS: *Position finding, *Velocity, *Acceleration, Mathematical analysis, Equations, Radar, Radar stations, Radar analysis.

A procedure is presented for computing Cartesian velocity and acceleration of an object from the range data of three noncollinear radar stations. Certain methods of obtaining data and using the procedures are indicated. (Author)

AD-292 124 Div. 6
(TISTW/PCR) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
A STANDARDIZATION OF THE HURST RADSAN NEUTRON DETECTOR,
by A. H. Redmond and M. B. Salamon. 19 Nov 62, 19p. incl. illus. tables, 8 refs. (Rept. no. NRDL-TR-598)
Unclassified report

DESCRIPTORS: *Neutron detectors, Tests, Test methods, Dose rate, Instrumentation, Numerical analysis, Standardization.

Dose measurements have been made with five Radsan detectors at the same operating conditions using a 100 channel analyzer and computing dose from the pulse height distribution. The detectors responded to an 80 gram plutonium beryllium neutron source at 50 centimeters with a sensitivity about 21 percent higher than the first collision dose computed from the spectral distribution. An explanation is offered. Responses to a 2 gram similar source mounted on the detectors were correlated with the counting rate on a scaler, giving a figure for a quick check of detector condition. Both measurements gave similar ratios of dose-to-counts in a 10 minute period. A shift of spectrum threshold with detector temperature rise is described. (Author)

AD-292 142 Div. 6, 8
(TISTE/OHD) OTS price $8.60

Radio Receptor Div., General Instrument Corp., Hicksville, N. Y.
AN/GPA-44.
Final development rept.
16 Oct 58, 1v. incl. illus.
(Contract AF 30(635)11625)
(RADC TDR 62-610) Unclassified report

DESCRIPTORS: *Identification systems, *Target recognition, Radar equipment, Coding, Switching circuits, Timing circuits, Triggered gates, Transistor amplifiers, Wiring diagrams.

This report covers the design and development of the AN/GPA-44. Design criteria and assumptions are discussed and some design equations derived. (Author)

AD-292 150 Div. 6, 5, 8
(TISTW/PCR) OTS price $12.50

Cubic Corp., San Diego, Calif.
MATTS EVALUATION STUDY.
Final technical rept.
Nov 62, 116p. incl. illus. tables.
(Contract AF 08(635)2832, Proj. 7840)
(ASD TDR 62-118)
Unclassified report

DESCRIPTORS: *Target position indicators, *Air control centers, Target recognition, Targets, Airborne, Air combat analyzers, Air position indicators, Documentation, Tests, Errors, Flight testing, Handbooks, Servo systems, Flight paths, Computers, Programming, Data processing systems, Radar tracking, Control systems.

An analysis of the Multiple Airborne Target Trajectory System (MATTS) located at Tyndall AFB, Florida is presented. This analysis includes discussions of system discrepancies, documentation corrections, recommendations for hardware improvements, and a plan for completing a system evaluation. (Author)

AD-292 936 Div. 6, 18, 30
(TISTW/JEA) OTS price $8.60

General Electric Co., Syracuse, N. Y.
AIR WEAPONS CONTROL SYSTEM 412L.
Quarterly reliability program rept. no. 7.
30 Sep 62, 1v. incl. illus. tables (Rept. no. AWCS-SQR-7)
(Contract AF 19(628)513)
Unclassified report

DESCRIPTORS: *Electrical equipment, *Radar equipment, Radar tracking, Radar interconnecting assemblies, Data transmission systems, Communication equipment, Data processing systems, Air control centers, Radar jamming, Power supplies, Aircraft intercept control systems, Statistical data, Quality control, Tests, Semiconductors, Failure (Mechanics), Scheduling, Standards, Training, Height finding, Reliability, Display systems.

The reliability program of air weapons control system 412L is described. Maintainability and reliability are described for the data processing and display subsystem (AN/GPA-73), the detector-tracker group (AN/FSA-12), the surveillance-identification group (OA-1723/GPA-73), the height data group (OA-1718/GPA-73), the site-to-site data link group (OA-1724/GAP-73), the weapons control group (AN/FSA-21), and the jammer tracking group (AN/FSA-23).

AD-292 969 Div. 6, 5, 8
(TISTW/PCR) OTS price $.75

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A REVIEW OF PHASE CENTERS.
Final rept., Apr-July 62,
by Donald E. Lewis. Oct 62, 16p. incl. illus. 17 refs. (Rept. no. ASD TDR 62-800)
(Proj. no. 5237)
Unclassified report

DESCRIPTORS: *Antennas, Theory, Spheres, Cylindrical bodies, Antenna radiation patterns, Scattering, Wave analysis, Wave characteristics, Wave transmission, Antenna horns, Equations, Geometry, Radar targets, Electromagnetic waves, Radar, Phase studies.

The concept of phase center is introduced as it is used in standard textbooks on antenna theory. An elementary consideration of wave functions is used to show that the idea is most readily applied when the far field radiated by an element can be described as having equiphase surfaces that are spherical or cylindrical. While this simplification is useful in general discussions, actual determination of phase center location for an antenna is shown to require more thorough investigation. Principal-plane phase centers are found to be, in general, non-coincident. If the antenna under consideration can be viewed as an aperture, this separation between phase centers can be taken as a phase error and corrections can be introduced. Experimental techniques for determining phase center location and a scattering-theory application of the concept are discussed. The importance of the phase center is established for those cases in which it is defined. (Author)

AD-293 462 Div. 6, 2
(TISTW/DLW) OTS price $4.60

Geotechnical Corp., Garland, Texas.
LONG RANGE SEISMIC MEASUREMENTS, HYRAX.
Report on Vela-Uniform Proj. 8.4.
30 Oct 62, 1v. incl. illus. tables (Geotech TR no. 62-17)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Seismic waves, Measurement, Recording systems, Detection, Seismographs, Underground explosions.

An analysis is presented of seismic data recorded from the HYRAX event by the Long Range Seismic Measurements (LRSM) program established under VELA-UNIFORM project 8.4. This program was established to record and analyze short-period and long-period seismic data from a planned series of United States underground nuclear tests. (Author)

AD-293 469 Div. 6, 2
(TISTW/DLW) OTS price $4.60

Air Force Technical Applications Center, Washington, D. C.
LONG RANGE SEISMIC MEASUREMENTS, HARDHAT.
Report on Vela-Uniform Proj. 8.4.
30 Nov 62, 1v. incl. illus. tables, ref.
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Seismic waves, Measurement, Recording systems, Instrumentation, Detection, Seismographs, Underground explosions.

An analysis is presented of the LRSM film seismograms from 40 mobile field teams, from the Wichita Mountains Seismological Observatory (WMO), Oklahoma, and from several experimental or temporary stations operated in connection with existing AFTAC commitments during the HARDHAT underground nuclear explosion event. (Author)

AD-293 482 Div. 6, 2
(TISTW/DLW) OTS price $3.60

Data Analysis and Technique Development Center, United ElectroDynamics, Inc., Alexandria, Va.
LONG RANGE SEISMIC MEASUREMENTS, AARDVARK.

Report on Vela-Uniform Proj. 8.4.
12 May 62, Rev. 21 Nov 62, 1v. incl. illus. tables, 3 refs. (DATDC rept. no. 23)
(Contract AF 33(657)7427)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Seismic waves, Measurement, Recording systems, Statistical analysis, Detection, Seismographs, Underground explosions.

AARDVARK was detonated at the Nuclear Test Site on 12 May at 19:00:00.1 GCT. A visual analysis is given of the AARDVARK seismograms as recorded at the LRSM sites. These recording sites are principally located in the western United States. (Author)

AD-293 483 Div. 6, 2
(TISTW/DLW) OTS price $2.60

Data Analysis and Technique Development Center, United ElectroDynamics, Inc., Alexandria, Va.
LONG RANGE SEISMIC MEASUREMENTS, CHINCHILLA.
Report on Vela-Uniform Proj. 8.4.
19 Feb 62, rev. 7 Nov 62. 1v. incl. illus. tables, 2 refs. (DATDC rept. no. 23)
(Contract AF 33(657)7427)
Unclassified report

DESCRIPTORS: *Nuclear explosives, *Seismic waves, Measurement, Recording systems, Statistical analysis, Detection, Seismographs, Underground explosions.

CHINCHILLA was detonated at the Nuclear Test Site (NTS) on 19 February 1962. Visual analysis is presented of CHINCHILLA seismograms as recorded at the LRSM sites. The recording sites are principally located in the western United States. The principal purpose of this report is the accumulation of additional statistical information from CHINCHILLA. These are travel times, residuals, amplitudes, etc. at the various sites. (Author)

7. ELECTRICAL EQUIPMENT

AD-292 064 Div. 7, 4
(TISTM/REB) OTS price $5.60

Westinghouse Electric Co., Pittsburgh, Pa.
AN INVESTIGATION OF SOLID ELECTROLYTE FUEL CELLS.
Quarterly technical progress rept. no. 3,
by D. H. Archer, W. G. Carlson and others. 1962, 26p. illus.
(Contract AF 33(657)8251)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrolytes, *Electrodes, Solids, Zirconium compounds, Oxides, Yttrium compounds, Calcium compounds, Oxygen, Resistance, Platinum.

The following progress was made toward the realization of a practical solid electrolyte power system: (1) improved electrolyte resistivity measurements were made on both the $(ZrO_2)_{0.85}(CaO)_{0.15}$ and the $(ZrO_2)_{0.9}(Y_2O_3)_{0.1}$ electrolytes using 4 terminal specimens; (2) the properties of Pt paste electrodes applied to the above substrates were studied; (3) the 3rd and 4th stacked tube fuel cell batteries each consisting of 3 cells connected in series were assembled and tested; (4) various types of glass seals have been considered. A number of promising glass compositions have been examined for compatibility with the electrolyte; (5) studies aimed at determining the size of stacked tube solid electrolyte power plants consisting of a number of parallel tube stacks which could be operated without internal cooling of the stack array were completed; (6) the effects of reaction product back diffusion in the fuel stream could result in lowered cell stage voltages. The relationships between stack length, stack diameter, and operating temperature, pressure and current density needed to prevent excessive voltage loss were developed; (7) operation of the solid electrolyte fuel cell using O as the oxidant was demonstrated; and (8) cell segments of reduced length and of ''bell and spigot'' design were fabricated. (Author)

AD-292 134 Div. 7, 27
(TISTM/RGR) OTS price $3.60

Kellogg, M. W., Co., New York.
DESIGN STUDY OF A HYDROGEN-GENERATING PLANT FOR SUBMARINE USE BASED ON THE STEAM REFORMING OF METHANOL.
Rept. for June-Sep 62,
by G. T. Skaperdas, W. H. Heffner and A. C. Veverka. 30 Sep 62, 31p. incl. illus. tables, 7 refs. (Rept. no. RD-62-953)
(Contract NObs-86744)
Unclassified report

DESCRIPTORS: *Fuel cells, *Hydrogen, *Gas generating systems, Submarines, Methanols, Steam, Catalysts, Palladium catalysts, Silver catalysts, Decomposition, Chemical reactions.

A design study is made of an operable hydrogen-generating plant based on the steam reforming of methanol, and intended as a source of hydrogen for fuel cells to be used in submarine propulsion. The plant is designed to supply up to 70 pounds per hour of pure hydrogen and is optimized on the basis of minimum volume, weight, and oxygen consumption. The hydrogen-generating equipment designed has a volume of about 105 cubic feet, occupies a 420-cubic foot space in the submarine, and weighs approximately 8,360 pounds. For ten days of continuous operation at normal capacity (20 pounds of hydrogen per hour), 9,630 pounds of oxygen are required for combustion purposes, while about 31,280 pounds of methanol are required as feed and auxiliary fuel. Their volumes are 139 cubic feet and 634 cubic feet, respectively. Response time of the system to a change in demand from minimum to maximum hydrogen production is about 1 1/2 minutes. (Author)

AD-292 139 Div. 7, 31
(TISTM/EJH) OTS price $14.00

Lummus Co., New York.
DESIGN STUDY FOR A HYDROGEN GENERATION PLANT FOR SUBMARINE FUEL CELLS.
Final rept.
30 Sep 62, 1v. incl. illus. tables.
(Contract NObs-86746, Proj. SF 013-06-04)
Unclassified report

DESCRIPTORS: *Fuel cells, *Power supplies, *Submarines, *Gas generating systems, Hydrogen, Ammonia, Liquefied gases, Vaporization, Decomposition, Oxygen, Nitrogen, Storage, Production, Design, Chemical engineering, Fuels.

Contents:
Scope of study
Basis of design
Process
Plant
Development

Division 7 - ELECTRICAL EQUIPMENT

AD-292 143 Div. 7
(TISTE/OHD) OTS price $5.60

General Electric Co., Philadelphia, Pa.
ADVANCED SOLAR THERMIONIC GENERATORS.
Quarterly technical progress rept. no. 1, Sep-Nov 62,
by R. R. Herrick, R. C. Keyser and L. L. Dutram.
Dec 62, 52p. incl. illus. tables, 3 refs.
(Contract AF 33(657)8947, Proj. 8173)
Unclassified report

DESCRIPTORS: *Solar cells, *Thermionic emission, Cesium, Vapors, High temperature research, Molybdenum, Tantalum, Test methods, Cathodes.

Performance data is presented obtained during solar testing of the cavity vapor generator system with series and parallel converter arrangements at cathode temperatures of 1400 to 1500 C. Misorientation data and simulated orbital thermal cycling data have also been obtained. System studies are given for selection of a configuration suitable for solar evaluation. (Author)

AD-292 199 Div. 7, 25, 14
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE CALCULATION OF THE IONIZING INTENSITY OF THE ELECTRICAL FIELD OF A LAMINATED DIELECTRIC MADE OF IMPREGNATED CAPACITOR PAPER,
by D. S. Varshavskiy. 15 Oct 62, 10p. incl. illus. 10 refs.
(Trans. no. FTD-TT-62-1263 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, no. 6, pp. 22-26, 1961)
Unclassified report

DESCRIPTORS: *Paper capacitors, *Laminates, *Dielectrics, Electric fields, Theory, Ionization, Intensity, Impregnation, USSR.

Equivalent circuits for impregnated capacitor paper were examined. An expression was derived for the ionizing intensity of the electrical field in a dielectric. Reasons for the discrepancy between the data obtained on the basis of this expression and the experimental result were analyzed. An expression was derived for the determination of the ionizing intensity in a laminated dielectric made of impregnated capacitor paper which agrees satisfactorily with the experimental data. (Author)

AD-292 203 Div. 7
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION OF A TRI-PHASE HEATER WITH ANGULAR ELECTRODES,
by T. A. Glazenko. 7 Nov 62, 11p. incl. illus. tables, 6 refs. (Rept. no. FTD-TT-62-1345 from Zapiski Leningradskogo Sel's Kiklozyystuennogo Instituta 12:pp. 199-208, 1956)
Unclassified report

DESCRIPTORS: *Heaters, *Electrodes, Translations, USSR, Resistance, Electric fields, Measurement.

The field in the central zone of a 3-phase electrode preheater appears to be rotating, elliptical. In zones between sections of electrodes extending from the corresponding peaks by more than 0.5 diam. the field can be considered as pulsating. The derived formulas allow one, with sufficient practical accuracy, to calculate the power scattered by a tri-phase electrode preheater. The described method of determining power scattered in the zone of the rotating field can be utilized in calculating polyphase preheaters with electrodes of different form. (Author)

AD-292 220 Div. 7
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A SYNCHRONOUS MAGNETOGASDYNAMIC A-C GENERATOR,
by V. S. Yakovlev. 15 Nov 62, 3p. incl. illus.
(Trans. no. FTD-TT-62-195 from Soviet Patent no. 141961, (693895/24), 19 Jan 61)
Unclassified report

DESCRIPTORS: *Generators, *Power supplies, *Magnetohydrodynamics, Electric currents, Alternating current, Gas ionization, Combustion, Gas flow, Fuels, Electrical conductance, USSR, Filament wound construction.

A synchronous magnetogasdynamic a-c generator in which an emf is induced in the conductors of the stator winding through their interaction with a flow of ionized gas which is generated as the result of the combustion of a fuel with alkali-metal additives was developed. For the purpose of increasing the maximum power of the generator it was constructed without a rotor. The alternating-pole excitation system is made up of portions of increased electrical conductivity of the gas, which are created by intermittent combustion of the fuel and are penetrated by an electric current passed through the gas crosswise to the flow. (Author)

AD-292 226 Div. 7
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE THEORY OF A MAGNETOGASDYNAMIC GENERATOR,
by M. I. Kiselev. 26 Sep 62, 10p. incl. illus. 5 refs. (Trans. no. FTD-TT-62-1181 from Vestnik Moskovskogo Universiteta, no. 1, pp. 63-68, 1962)
Unclassified report

DESCRIPTORS: *Generators, *Power supplies, *Magnetohydrodynamics, Electric currents, Alternating current, Gas ionization, Gas flow, Reynolds number, Supersonics, Electrical conductance, Theory.

The effect of profiling the channel of a magnetogasdynamic generator on the efficiency of the conversion of thermal energy into electrical energy and on the dimensions of the generator was investigated. The order of the efficiency in the case of small magnetic Reynolds numbers in the supersonic region is indicated, and a method of estimating the efficiency for Re greater than or equal to 1 is given. Viscosity and heat conduction are neglected. (Author)

AD-292 252 Div. 7, 4
(TISTM/TCG) OTS price $5.60

Chemical Construction Corp., New York.
DESIGN STUDY HYDROGEN GENERATION FROM LIGHT PETROLEUM DISTILLATE FOR BUREAU OF SHIPS CODE 660S,
by A. Bernas, A. Chevion, and A. Phillips.
28 Sep 62, 1v. incl. illus. tables.
(Contract NObs-86747)
Unclassified report

DESCRIPTORS: *Hydrogen, *Generators, Petroleum, *Catalysis, Fuel cells, Electricity, Power supplies, Submarines, Vaporization, Hydrocarbons, Chemical reactions, Steam,

Oxygen, Laboratory equipment, High pressure research, High temperature research, Carbon dioxide, Carbon compounds, Monoxides, Diffusion, Semipermeability, Palladium alloys, Silver alloys, Synthesis.

A feasibility study was carried out to determine if a practical H generator using the catalytic reforming of a light petroleum distillate, such as JP-5, could be designed. The process proposed for the production of hydrogen by the reforming of liquid hydrocarbons involves established and proven technology. Vaporized hydrocarbon is catalytically reacted with steam and oxygen at elevated pressure and temperature. The resulting process gas stream consists of H, CO2 and CO, together with excess steam. Pure H is separate from the final gas stream by diffusion. After the separation of the H, the residual gas stream is catalytically reacted by controlled addition of O to achieve complete combustion. The H generator will operate in accordance with good engineering practice. (Author)

AD-292 272 Div. 7, 8
(TISTE/OHD) OTS price $4.60

General Electric Co., Holyoke, Mass.
HIGH POWER, HIGH VOLTAGE, AUDIO FREQUENCY TRANSFORMER DESIGN MANUAL.
Quarterly interim development rept. no. 1, 1 July-30 Sep 62,
by John G. Howe and R. D. Smith. 1 Oct 62, 25p. incl. illus. refs.
(Contract NObsr-87721)
Unclassified report

DESCRIPTORS: *Audiofrequency transformers, Extremely low frequency, Very low frequency, Power, Voltage, Electric insulation, Temperature, Thermal stresses, Liquid cooled, Inductance, Electrostatic capacitance, Mathematical analysis.

Two subjects are included: (1) A general discussion on the insulation and mechanical considerations of transformers with special emphasis on the insulation systems used for 200 C hot spot. Also included are tables showing the important properties and problems of various insulation systems. (2) The details were given covering the calculation of distributed capacitance, leakage inductance, and open circuit inductance for high power audio transformers. (Author)

AD-292 273 Div. 7, 4
(TISTM/TCG) OTS price $12.00

Girdler Corp., Louisville, Ky.
DESIGN STUDY ON THE GENERATION OF HYDROGEN FROM METHANOL FOR FUEL CELL SYSTEMS ON BOARD SUBMARINES,
by H. A. Bennett, Jr., J. P. Bocard and others. 12 Oct 62, 163p. incl. illus. tables.
(Contract NObs-86743)
Unclassified report

DESCRIPTORS: *Hydrogen, *Generators, *Methanols, *Fuel cells, Catalysis, Carbon dioxide, Carbon compounds, Monoxides, Thermodynamics, Chemical reactions, Adiabatic gas flow, Palladium, Diffusion, Purification, Instrumentation, Enthalpy, Heat of reaction, Physical properties, Oxygen, Water, Processing, Submarines, Synthesis.

A design was developed for the manufacture of H for fuel cell application aboard submarines using methanol as the raw material. As an aid in studying and evaluating the process problems, a number of general thermodynamic calculations were made and charts constructed. These should prove useful in future phases of the methanol program. A number of routes were also investigated. Considering the state-of-the-art and the particular requirements of the submarine application, the evaluation led to the proposed processing sequence. (Author)

AD-292 275 Div. 7, 8, 9, 12, 19, 22, 26
(TISTE/OHD) OTS price $1.10

Columbia U. School of Engineering, New York.
RESEARCH INVESTIGATION IN CONTROL SYSTEMS.
Final rept., 1 Dec 60-31 May 62,
by George M. Kranc. Sep 62, 9p. (Rept. no. CU-4-62-AF-998-EE)
(Contract AF 49(638)998, Proj. 9768)
Unclassified report

DESCRIPTORS: *Control systems, *Bibliography.

Abstracts of 5 reports in the field of control systems theory are given. These are: (1) a class of nonlinear, inertial and random plants which satisfy certain optimizability conditions; (2) the optimal time problem solution which is extended to time-varying plants with r inputs and m outputs; (3) a method for obtaining the order of the system characteristic equation from observation of input-output data; (4) techniques for interrelating the inputs to two separate dynamic systems when it is required that the output of each satisfy a functional relationship; and (5) a unified theory for the time-optimal control of general, linear, not necessarily normal plants, with generalized constraints on the control variable.

AD-292 299 Div. 7, 26
(TISTM/ODN) OTS price $3.60

Times Wire and Cable Co., Inc., Wallingford, Conn.
DESIGN AND DEVELOPMENT OF IMPROVED WATERTIGHT COAXIAL CABLE.
Interim development rept., 29 June-30 Sep 62,
by David A. Peterson. 30 Sep 62, 24p. incl. illus. tables (Engineering rept. no. 222-A)
(Contract NObsr-87678)
Unclassified report

DESCRIPTORS: *Coaxial cables, *Electrical equipment, Design, Manufacturing methods, Attenuation, Stability, Electrostatic capacitance, Impedance, Abrasion, Radiofrequency, Voltage, Standing wave ratios, Tests, Test equipment, Moistureproofing, Signal generators, Power supplies, Oscillators, Detectors, Materials, Ethylenes, Polymers, Copper, Silver plating, Urethanes, Dielectrics.

Manufacture of 24 out of 30 sample constructions was completed. The remaining 6 will be manufactured as soon as raw material is available. Test methods were selected, equipment constructed and test procedures formulated on all tests except pliability. Preliminary attenuation measurements at 1.7 GC indicate that approximately 28% improvement in attenuation of RG-214/U and RG-218/U is possible by changing the braid design. The improvement in RG-218/U is brought about by changing from a large strand bare copper braid to a small strand silver plated copper. The decrease in RG-214/U is the result of changing from a small size silver plated strand braid to a silver plated ribbon braid. A special construction utilizing a braided center conductor shows that a more flexible cable can be manufactured, but with a considerably higher attenuation. (Author)

Division 7 - ELECTRICAL EQUIPMENT

AD-292 631 Div. 7
(TISTM/SJR) OTS price $4.60

Engelhard Industries, Inc., East Newark, N. J.
FUEL CELL CATALYSTS.
Quarterly rept. no. 1, 1 July-30 Sep 62,
by O. J. Adlhart. 30 Sep 62, 39p. incl. illus. tables, 14 refs.
(Contract DA 36-039-sc-90691)
Unclassified report

DESCRIPTORS: *Fuel cells, *Cathodes, *Anodes, Methanols, Formaldehyde, Glycols, Glucose, Platinum, Sodium compounds, Sulfates, Phosphates, Potassium compounds, Bicarbonates, Sulfuric acid, Catalysts, Polarization.

The electrochemical oxidation of methanol and related fuels was studied in sulfuric acid and selected salt solutions on platinum catalysts at temperatures ranging from ambient to 200 C. Anode potentials improve greatly with increase in temperature. In the case of methanol, polarization decreases at the rate of 1.7 mV/degree C, in sulfuric acid using platinum catalysts. The decline in polarization is slower in potassium bicarbonate solutions indicating a diffusion limited electrode process. Poisoning effects are being encountered at temperatures of 150 C. While the loss of activity is particularly pronounced with formic acid, and increase in polarization is also observed with methanol at prolonged current drains. Further studies are required to elucidate the cause of these findings. Cathode potentials also improve substantially with temperature, which is attributed to an accelerated rate of decomposition of the peroxide intermediate. The performance of the oxygen electrode at ordinary and elevated temperatures is strongly affected by the pH of the solution. (Author)

AD-292 932 Div. 7, 8, 30
(TISTE/OHD) OTS price $1.10

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
EVALUATION OF ELAPSED TIME INDICATORS AND DEVELOPMENT OF AN APPLICABLE SPECIFICATION.
Final rept.,
by J. J. Scholtes. 6 Dec 62, 7p. incl. illus. table (Rept. no. NADC-EL-6283)
Unclassified report

DESCRIPTORS: *Time interval counters, *Feasibility studies, Electric clocks, Electrochemistry, Mercury, Electronic equipment, Vibration, High altitude, Life expectancy, Corrosion, Tests, Navy Department.

The evaluation results of elapsed time indicators indicated that electro-mechanical types are better suited to the environment of service use than electro-chemical or electronic types at present. (Author)

AD-293 200 Div. 7
(TISTE/PAR) OTS price $1.60

Burndy, Norwalk, Conn.
PRODUCTION ENGINEERING OF TRIAXIAL PULSE CONNECTORS.
Quarterly progress rept. no. 5, 16 June-15 Sep 62,
by Maxwell E. Peel. 15 Sep 62, 14p.
(Contract DA 36-039-sc-85964)
Unclassified report

DESCRIPTORS: *Electric connectors, Design, Materials, Epoxy resins, Ceramic materials, Molding materials, Casting, Bonding, Production, Seals, Insulating materials, Electric insulation, Electric cables.

Progress is reported on the evaluation of materials for the primary insulator and its manufacture. Casting of the primary insulator and cementing it with a conductive adhesive to the inner shell proved to be the most satisfactory method of manufacturing the primary insulator. An epoxy formulation proved quite satisfactory, allowing the material to be cast by a gravity feed system rather than a vacuum system. The mold used proved to be simple in design and operation, and had a long mold life. (Author)

AD-293 408 Div. 7, 25
(TISTP/JW) OTS price $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
STATIC ENERGY CONVERSION STUDIES.
Quarterly technical progress rept. no. 2, 18 Aug-17 Nov 62,
by J. Colwell and R. L. Palmer. 30 Nov 62, 19p. incl. illus. table, 10 refs. (Rept. no. GACD-3705)
(Contract AF 33(657)9203, Proj. 8173)
Unclassified report

DESCRIPTORS: *Solids, *Graphite compounds, *Semiconductors, *Electric power production, *Generators, Magnetic fields, Numerical analysis, Phonons, Electrons, Relaxation time, Power transmission.

The first theoretical work was on the phonon-electron interaction. Numerical studies were undertaken to see what efficiency might be expected from a material such as InSb or HgTe which has a large ratio of electron to hole mass. The efficiences of HgTe compare reasonably well with graphite, which probably has a bigger thermal conductivity, and smaller efficiency, than indicated. The optimum geometrical shape was worked out and it was discovered that there is still one parameter, the temperature gradient, which is not specified even after the power output and the optimum shape have been specified. Experimental investigations were started on graphite and HgTe samples. The initial plan of measuring the Ettingshausen coefficient has not proven feasible, so the Nernst coefficient has been measured instead. Since this allows one to calculate the figure of merit by using the thermal conductivity found in the literature, this does not appear to be a serious stumbling block. (Author)

AD-293 425 Div. 7, 26
(TISTM/ODN) OTS price $5.60

Ray-O-Vac Co., Madison, Wis.
LOW TEMPERATURE BA-2270/U-XLT-1 BATTERIES.
Final rept., 15 July 58-31 July 62,
by J. W. Paulson. 31 July 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-78144, Proj. 3A99-09-002-02)
Unclassified report

DESCRIPTORS: *Low temperature batteries, *Storage batteries, *Dry cells, *Power supplies, Production, Tests, Low temperature research, Electrolytes, Battery separators, Lithium compounds, Chlorides, Bromides, Manganese compounds, Dioxides, Seals, Zinc electrodes, Failure (Mechanics), Storage, Corrosion, Industrial plants, Electric discharge.

Facilities for producing flat cell type BA-2270/U-XLT-1 batteries at a pilot line level were activated. Fifty preproduction batteries were made for Signal Corps testing and approval. Five hundred production batteries were then

constructed of which 310 were in-plant tested and 190 submitted to the Signal Corps for testing. In-plant performance results, up to and including 24 months delay, are reported for the BA-2270/U battery of a flat cell construction. Discharge testing was conducted at +70, -20 and -40 F. Problems of electrolyte leakage are discussed along with their effect on performance. (Author)

AD-293 433 Div. 7, 25
(TISTM/ODN) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
HALL EFFECT INVESTIGATIONS.
Quarterly progress rept. no. 1, 1 July-30 Sep 62,
by H. H. Wieder and A. R. Clawson. 15 Dec 62, 25p. incl. illus. tables.
(NAVWEPS rept. no. 7242)
Unclassified report

DESCRIPTORS: *Semiconducting films, *Indium compounds, *Antimonides, *Thin films, Electromagnetic properties, Hall effect, Conductivity, Thickness, Gold, Electrodes, Voltage, Theory, Electric potential, Resistance, Electrical properties, Evaporation, X ray diffraction analysis, Electrons.

Galvanomagnetic measurements on evaporated thin films of indium antimonide were made in order to determine the optimum conditions for the fabrication of Hall generators. The effective electron mobility is thickness-dependent and reaches values of 11,000 sq cm/volt-sec for a film 0.0002 cm thick. The electrostatic shorting effects of evaporated gold electrodes were evaluated and preliminary results are reported on the magnetoresistive contribution of InSb films. (Author)

AD-293 453 Div. 7, 20, 8
(TISTM/ODN) OTS price $3.00

Aerojet-General Nucleonics, San Ramon, Calif.
FEASIBILITY DETERMINATION OF A NUCLEAR THERMIONIC SPACE POWER PLANT.
Final rept. for 1 Apr 61-31 Aug 62,
by K. E. Buck, C. R. Fisher and I. M. Rehn.
Nov 62, 150p. incl. illus. tables, 51 refs.
(Rept. no. AN-700)
(Contract AF 33(616)8119, Proj. 8173)
(ASD TDR 62-827) Unclassified report

DESCRIPTORS: *Power supplies, *Nuclear power plants, *Electric power production, *Thermionic emission, Liquid metals, Lithium, Radiators, Feasibility studies, Refractory materials, Niobium alloys, Zirconium alloys, Reliability, Space flight, Design, Cathodes, Stresses, Rupture, Creep, High temperature research, Electric insulation, Configuration, Anodes, Spaceships.

The first phase of a program to determine the feasibility of a nuclear space-power system that utilizes a thermionic radiator is described. In this concept, thermionic converters are mounted in the radiator of the power plant and lithium is circulated directly from the reactor through the radiator. Fins attached to the anode reject waste heat to space. The basic feasibility of the thermionic radiator concept was demonstrated. An electrically heated, refractory metal (Cb-1Zr) test loop which incorporated a centrifugal pump, thermionic converter, heat sink, and regenerator was constructed. Lithium was circulated to the thermionic converter at temperatures ranging from 2150 to 2260 F. A cylindrical thermionic converter with a cathode surface area of 80 sq. cm. was operated at power densities up to 1 watt/sq. cm. Limited systems analysis was also carried out in order to establish the potential specific performance of the power plant concept. (Author)

AD-293 490 Div. 7, 4
(TISTM/EJH) OTS price $4.60

Speer Carbon Co., Niagara Falls, N. Y.
FUEL CELL ELECTRODE MATERIALS.
Quarterly rept. no. 2, 1 June-31 Aug 62,
by W. E. Parker, R. W. Marek and E. A. Heintz.
Mar 62, 39p. incl. illus. tables, 10 refs.
(Rept. no. 2; SCC-15)
(Contract DA 36-039-sc-88954, Proj. 3A 99-09-001-02)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrodes, *Oxygen electrodes, *Hydrogen electrodes, Hydrogen, Oxygen, Carbon, Graphite, Carbon black, Binders, Sulfates, Porosity, Physical properties, Polarization, Electrochemistry, Surface properties, Manufacturing methods, Moistureproofing, Materials.

Two series of electrodes were prepared in which raw materials and proportions were held constant while processing conditions were varied so as to produce a range of physical properties. An excellent systematic variation in permeability and average pore size (in the measured region of 100 microns > D>0.6 microns) was obtained. While a range of values of contact angle, surface area and total porosity were obtained, variation was not as systematic as was desired. Electrochemical evaluation of these electrodes shows that raw material selection does influence polarization but is not a single controlling factor. Data available to date indicates that an inter-relationship of porosity, average pore volume and permeability contributes to electrode fuel cell behavior. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-291 930 Div. 8, 5
(TISTM/ODN) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
COMPATIBILITY EVALUATION FOR PRINTED TAPE BUFFER EQUIPMENT,
by Phillip I. Hershberg. Sep 62, 13p. incl. illus. tables, 5 refs. (AFCRL 62-891)
(Proj. 433L)
Unclassified report

DESCRIPTORS: *Communication systems, *Communication equipment, *Intercommunication systems, Graphitized recording paper, Tests, Coding, Errors, Electronic equipment.

The results of a testing program conducted to evaluate the compatibility of two specialized data-handling devices developed as printed-tape buffer equipment are discussed. These equipments, the Distributor-Transmitter, Telecode AN/GGT-2 and the Electrographic Telecode Recorder AN/GTH-1, utilize a novel method of recording and, subsequently, transmitting high-speed communications line information. These units replace the commonly utilized punched-tape and magnetic tape buffer units. The report describes the operation of these units and provides factual data as to their compatibility. (Author)

AD-291 956 Div. 8
(TISTE/OHD) OTS price $3.60

Cruft Lab., Harvard U., Cambridge, Mass.
FRESNEL GAIN OF APERTURE ANTENNA,
by Teruzane Soejima. 21 May 62, 23p. illus. 6 refs. (Scientific rept. no. 13 (Series 2))
(Contract AF 19(604)4118, Proj. 5635)
(AFCRL-62-595) Unclassified report

DESCRIPTORS: *Antennas, *Propagation, Mathematical analysis, Focusing, Theory.

When a transmitting aperture Ao and a receiving aperture Bo are coupled in the Fraunhofer region, the ratio of received to transmitted power is given by the Friis formula. It is known that the Fraunhofer gains Gao and Gbo of Ao and Bo are constant and are determined independently. In this report, the product of the gains GaGb in the Fresnel region is determined as an integral over both apertures, assuming the gains Ga and Gb for Ao and Bo. It is pointed out that GaGb cannot generally be separated into the individual factors, but a formula similar to that of Friis still holds in the Fresnel region. The author proposes to define the gain-product reduction factor, gamma sub a x gamma sub b, as the ratio of GaGb to GaoGbo. The individual gain Ga or Gb may be determined only when Ao and Bo are identical and the illuminations of both apertures are the same. Then, the gain-reduction factor, gamma, is defined as the ratio of Ga to Gao. Assuming uniform amplitude and phase of illumination over Ao and Bo, gamma sub a x gamma sub b and gamma are determined for circular and rectangular apertures. For circular apertures, the same factors are determined for a set of illuminations which approximate commonly used tapers, and the effect of defocusing the primary feed in lenses and dishes is also discussed. (Author)

AD-291 972 Div. 8, 26
(TISTE/CRJ) OTS price $2.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS.
Quarterly progress rept. no. 1, 1 July-30 Sep 62.
30 Sep 62, 27p. incl. tables.
(Contract DA 36-039-sc-86734)
Unclassified report

DESCRIPTORS: *Variable resistors, *Manufacturing methods, Metal films, Production, Ceramic materials, Processing, Test equipment, Costs.

Efforts are being made to provide production type equipment and tools sufficient to demonstrate the capability of producing 350 multi-turn metal film trimmer resistors per 8 hour shift conforming to applicable specifications. (Author)

AD-292 065 Div. 8, 25, 9
(TISTE/CAM) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
STUDY OF ADVANCED TECHNIQUES FOR COOLING VERY HIGH POWER MICROWAVE TUBES (VORTEX FLOW),
by Lester Feinstein. 7 Dec 62, 13p. incl. illus. 11 refs.
(Contract AF 30(602)2760)
(RADC TDR 62-555) Unclassified report

DESCRIPTORS: *Electron tubes, Vortices, Water, Hydrodynamics, Theory, Heat transfer, Test equipment, Cooling.

Advanced techniques are studied for cooling very high power microwave tubes by the method of vortex flow of the coolant-in this case, water. To accomplish the objectives the work is considered to consist of two parts: (1) experimental study of vortex flow, and (2) theoretical or analytical study of this type of cooling. Investigation was concerned with (a) an examination of hydrodynamic stability concept and its applicability to the vortex flow problem and (b) design of the experiment and procurement of components for construction of the experimental facility. (Author)

AD-292 071 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Motorola, Inc., Phoenix, Ariz.
PRODUCTION DEVELOPMENT OF SILICON PLANAR EPITAXIAL TRANSISTOR WITH A MAXIMUM OPERATING FAILURE RATE OF 0.001% PER 1000 HOURS AT A CONFIDENCE LEVEL OF 90% AT 25 C.
Quarterly rept. no. 1, 1 May-31 July 62 on Production Engineering Measure,
by Benjamin R. Davis and George V. Russell.
31 July 62, 15p. incl. illus.
(Contract DA 36-039-sc-86728)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Silicon compounds, Production, Dioxides, Growth, Diffusion, Processing, Failure (Mechanics), Analysis, Wire, Bonding, Reliability.

Effort is made to improve production techniques in order to increase the reliability of silicon planar epitaxial transistor type 2N696 with a maximum operating failure rate of 0.001% per 1000

hours at a 90% confidence level at 25 C. as an objective. The failure rate is an objective, and as a minimum all of the following processes are to be improved toward attaining or exceeding the specified failure rate: surface preparation, diffusion processing, epitaxial starting material, wire bonding, metallizing and geometry definition. (Author)

AD-292 075 Div. 8, 22, 30
(TISTE/OHD) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
HERO SUPPORTING STUDIES.
Monthly progress rept. no. 2, 1-31 Aug 62, by Norman P. Faunce and Paul F. Mohrbach. 31 Aug 62, 16p. incl. illus. (Rept. no. P-B1980-2)
(Contract N178-8102)
Unclassified report

DESCRIPTORS: *Test methods, *Electric primers, *Electric fuzes, Electric detonators, Resistance, Radiofrequency, Measurement, Direct current, Waveguide couplers.

Evaluation tests intended to extensively characterize hot wire-bridged EED's have been outlined. This includes tests for both dc and RF functioning sensitivity. Tests to determine the rate of change of resistance with temperature, the RF cook-off power, and the effect of low level dc or RF excitation on normal functioning responses round out the program. Analyses are being made of errors to be expected in RF power measuring systems. The directivity errors associated with use of directional couplers to measure incident and reflected power are developed. These errors, both of which approach a common value of 2% for couplers with 40 db of directivity combine to give a possible maximum error approaching infinity. (Author)

AD-292 127 Div. 8
(TISTE/CRJ) OTS price $2.60

Technical Research Group, East Boston, Mass.
3-MILLIMETER WAVEGUIDE COMPONENTS.
Quarterly rept. no. 5, 1 July-30 Sep 62, by Alan J. Simmons. 31 Oct 62, 24p. incl. illus. tables (Rept. no. 161-5)
(Contract DA 36-039-sc-88979)
Unclassified report

DESCRIPTORS: *Waveguides, *Waveguide couplers, *Waveguide bends, *Waveguide filters, Transmission lines, Ferrites, Microwave equipment, Standing wave ratios, Radiofrequency attenuators, Transducers, Measurement, Extremely high frequency.

Waveguide component development was continued. Two mode filters which were oven-cured and aged appear to give stable satisfactory performance. Loss is approximately 15 db for the TE 11 mode, 0.2 db for the TE 01 mode. The directional coupler with .008 inch wall thickness gave satisfactory performance, with coupling variation 9.8 - 10.1 db over the band, directivity greater than 25.9 db. The final design of the standing wave detector was completed. By means of an absorbing sleeve and changes in tooth diameter the variable attenuator prototype has exhibited a maximum VSWR of 1.12 over the band. Attenuation may be varied 0 - 30 db. Design of a complete attenuator based on these results was carried out. Low and high power loads using the new load material were successfully built with VSWR under 1.05 over the band. Final data on the rotary joints is presented. Three db hybrids were made by electroforming mandrels produced by a punching process. Satisfactory performance was obtained on several units. A satisfactory method of matching the dual mode transducer was devised, consisting of an inductive iris in the side-arm and capacitive pin in the through-arm. (Author)

AD-292 129 Div. 8
(TISTE/CRJ) OTS price $2.60

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
S-BAND SOLID-STATE DETECTOR-AMPLIFIER.
Quarterly progress rept. no. 1, 12 Mar-31 May 62, by J. B. Franceschini, J. C. Greene, and G. W. Thomson. 31 May 62, 1v. incl. illus. 4 refs.
(Contract DA 36-039-sc-89198, Proj. 3A99-21-001-01)
Unclassified report

DESCRIPTORS: *Radar receivers, *Radio receivers, *Solid state physics, S band, Broadband, Intermediate frequency amplifiers, Semiconductors, Germanium, Band-pass filters, Garnet, Radiofrequency oscillators, Miniature electronic equipment.

The investigation of S-band solid-state receiver components has begun with the evaluation of a tunable YIG preselector, a transistorized balanced mixer, and a broad-band IF amplifier. The miniature yttrium-iron-garnet two-resonator filter can be tuned over more than one octave by varying the magnet current with a single voltage control. A balanced mixer was constructed using a transmission-line transformer and the base-to-emitter diode of a germanium transistor. However, at frequencies above half of the unity current gain frequency of the transistor, the local-oscillator power required increased, and the noise figure began to deteriorate. Broad-band IF amplifiers were constructed and tested. These transistorized, two-stage amplifiers had a high-frequency response of 475 mc with a 300-mc bandwidth and a gain of 10 db. (Author)

AD-292 131 Div. 8, 14
(TISTM/RGR) OTS price $12.00

Microwave Lab., Stanford U., Calif.
THE MICROWAVE CHARACTERISTICS AND APPLICATIONS OF FERROELECTRIC CERAMICS.
Technical rept.,
by M. DiDomenico, Jr. Oct 62, 151p. incl. illus. table, 69 refs. (ML rept. no. 960)
(Contract Nonr-22548, Proj. NR 373-361)
Unclassified report

DESCRIPTORS: *Ferroelectric materials, *Microwave equipment, Dielectrics, Ferroelectricity, Titanates, Barium compounds, Strontium compounds, X band, S band, Phase shifters, Radiofrequency attenuators, Frequency multipliers, Perturbation theory.

The purpose of this investigation was to study both theoretically and experimentally the uses of ferroelectric ceramics in microwave device applications. At microwave frequencies, ferroelectric ceramics behave as nonlinear dielectrics and exhibit small signal as well as large signal scaler nonlinear characteristics in both the dielectric constant and the rf dielectric conductivity. The preliminary part of this study gives a comprehensive review of the experimentally measured characteristics of the

ferroelectric titanates, and in particular of the ceramic 73 per cent BaTiO3 -27 per cent SrTiO3. An X-band electrically tunable ferroelectric phase shifter was constructed. Phase shifter was controlled by applying a dc electric field to the ferroelectric. The measured characteristics of this device showed that phase shifts of 40 - 50 degrees are attainable over a 400 Mc band centered about 9.3 kMc with insertion losses ranging from 2 - 6 db. The general incremental behavior of such small signal devices as phase shifters, attenuators, and tunable cavities is also discussed. The non-linear behavior of the 73 per cent BaTiO3 - 27 per cent SrTiO3 ceramic was further used to construct a harmonic generator operating from 3 kMc to 9 kMc. In order to assess the characteristics of ferroelectric traveling-wave harmonic generators, an example is worked out for an S-band TE sub-10 mode at the fundamental frequency of 3 kMc. (Author)

AD-292 135 Div. 8
(TISTE/CRJ) OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
TRAVELING-WAVE TUBE MIXER PROGRAM.
Interim engineering rept. no. 6, 1 Aug-31 Oct 62,
by L. Magill and A. S. Ferello. Nov 62, 18p. incl. illus. tables, 1 ref. (Rept. no. NA-8210-8283-6)
(Contract AF 33(616)8074)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Mixer tubes, *Microwave amplifiers, *Microwave oscillators, Helixes, Dielectric properties, Extremely high frequency, Coupling circuits, Microwave equipment, Impedance, Waveguides, Waveguide couplers, Magnets.

The conclusions of a detailed analysis of mixing millimeter waves in beam-type devices led to the design and construction of a two-helix traveling-wave-tube mixer. The design parameters were chosen after an analysis of helix gain, physical size and beam power. The effects of dielectric loading of the helix support structure were determined, and helix pitch altered to compensate for this loading. The presence of a fast waveguide mode in the support structure was discovered and this undesired mode was eliminated. A pole-piece design for the single-solenoid magnet, to be used with the mixer, was determined. The construction processing of detail mixer parts is being carried out smoothly, and subassembly construction is under way. (Author)

AD-292 141 Div. 8
(TISTE/CRJ) OTS price $3.60

Motorola, Inc., Scottsdale, Ariz.
EXTENSION OF ELECTRONIC EQUIPMENT LIFE PREDICTION STUDY.
Quarterly progress rept. no. 4, 15 June-15 Sep 62,
by W. N. Simpson and A. T. Kneale. 15 Sep 62, 29p. incl. illus. tables, refs. (Rept. no. WP-2643-4)
(Contract DA 36-039-sc-87235)
Unclassified report

DESCRIPTORS: *Test sets, *Radio equipment, *Electronic equipment, Test equipment, Instrumentation, Radio communication systems, Integral equations, Matrix algebra, Life expectancy, Measurement, Reliability, Mathematical prediction, Correlation techniques, Data processing systems, Programming.

Efforts were continued on determining the feasibility of providing field instrumentation capable of measuring the rate of degradation of performance of electronic equipment. Strains resulting from the present stresses are not a function of time. The stress values being used are too far inside the design limits of the radio sets. A temporary instability in test results, as a function of disassembly for calibration purposes, was observed. In an attempt to eliminate faulty data, a 12 x 12 tensor matrix A was formulated using only the three basic stresses. The reference row on the raw data card was maximized and fixed. Only slight correlation was obtained. By utilizing the foregoing and maintaining a constantly increasing tensor matrix, smooth tracking resulted. A new approach utilizing the characteristic equation for a three by three tensor matrix was programmed. Another approach utilizing a direct vector reduction of the data instead of a matrix solution was initiated. Results have provided successful prediction in 40% of the failures checked. Testing of the AN/PRC-6 radio sets is continuing with no change in procedure. (Author)

AD-292 161 Div. 8, 30
(TISTE/OHD) OTS price $3.60

Cooley Electronics Lab., U. of Michigan, Ann Arbor.
A COMPUTER-AUGMENTED TECHNIQUE FOR THE DESIGN OF LIKELIHOOD-RATIO RECEIVERS,
by T. G. Birdsall and L. W. Nolte. Oct 62, 36p. incl. illus. tables, 9 refs. (Technical rept. no. 130; 3674-3-T)
(Contract Nonr-122436)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Radio receivers, *Radio interference, *Signal-to-noise ratio, Radio signals, Digital computers, Design, Correlation techniques, Numerical analysis, Communications theory.

Standard approximation methods of design of detection receivers are reviewed, and a method based on fitting curves calculated on a high-speed computer is presented. This computer-augmented technique is applied to the design problem of a signal distorted by a sign-preserving, rapidly varying transmission gain. (Author)

AD-292 173 Div. 8, 1
(TISTW/DLW) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE EL CAMPO SOLAR RADAR ANTENNA,
by M. E. Devane and A. R. Dion. 17 Aug 62, 54p. incl. illus. 12 refs. (Technical rept. no. 276)
(Contract AF 19(628)500)
(AFESD TDR 62-251) Unclassified report

DESCRIPTORS: *Radar antennas, *Sun, *Dipole antennas, Radio astronomy, Antenna couplers, Standing wave ratios, Very high frequency, Electromagnetic wave reflections, Impedance, matching, Antenna radiation patterns, Transmission lines, Measurement, Radar reflections, Coupled antennas.

An antenna is described for use in a radar system designed to study reflections of VHF electromagnetic waves from the sun. This antenna consists of two rectangular planar arrays which occupy the same land surface and have dipole elements that are mutually perpendicular. The elements are excited by a combination of parallel and series feed networks. Each array produces a 0.75 degree by 12 degree fan-shaped beam

whose direction is set by the adjustment of the phase of the element currents. So far, the beam has been confined to directions located in the north-south plane which range from near broadside to 52.5 degrees south from broadside. Good performance for these beam directions was obtained with only two settings of the element-matching network. The directivity patterns of one of these arrays were measured by flying a properly instrumented airplane in its Fresnel region and good agreement with theoretical predictions was obtained. (Author)

AD-292 187 Div. 8, 9, 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A THERMODYNAMIC ANALYSIS OF THE THERMAL SYSTEM OF A MAGNETOHYDRODYNAMIC GENERATOR,
by D. P. Gokhshteyn. 31 Oct 62, 15p. incl. illus. tables, 9 refs. (Trans. no. FTD-TT-62-1326 from Teploenergetika, no. 3:pp. 51-56, 1962)
Unclassified report

DESCRIPTORS: *Generators, *Thermodynamics, Magnetohydrodynamics, Translations, Thermal utilization, Energy, Magnetic fields, Ionization, Combustion, Analysis.

A comparative analysis is made of the energy losses in an mhd installation of American design, in a vapor-gas installation of OTI-Hughes design, and in an mhd installation with a regenerative heater in which the intermediate coolant is a powder. (Author)

AD-292 201 Div. 8, 2
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTRONICS IN ASTRONOMY.
6 Nov 62, 2p. (Trans. no. FTD-TT-62-1339 from Otechestven Glas, p. 4, 19 Nov 61)
Unclassified report

DESCRIPTORS: *Electronics, *Astronomy, Electronic equipment, Atmosphere, Programming, Telescopes, USSR.

AD-292 219 Div. 8, 2
(TISTP/JW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BULLETIN OF THE COMMITTEE ON COMETS AND METEORS UNDER ASTRONOMICAL COUNCIL OF USSR ACADEMY OF SCIENCES (SELECTED ARTICLES).
20 Nov 62, 22p. incl. tables, refs. (Trans. no. MCL-226/1 from Byulleten' Komissii po Kometam i Meteoram Astronomicheskogo Soveta AN SSSR, no. 2, pp. 34-49, 1958)
Unclassified report

DESCRIPTORS: *Radar, *Meteors, Radio waves, Transmitter receivers, Resonance, Reflections, Reliability, Errors, Translations.

Contents:
Concerning an error in determining the coordinates of a radiant
Tentative results of radar observations of meteors on lambda = 10 meters
Concerning the problem involved in selection of a transmitter of the radar station for radio-analysis of meteoric traces
Certain special features in resonance reflection of radiowaves from meteoric traces

AD-292 231 Div. 8
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RESTORATION OF QUENCHING AND SYNCHRONIZING PULSE IN THE VIDIO SIGNAL AFTER MAGNETIC RECORDING,
by N. G. Deryugin and G. V. Voronetskiy.
7 Nov 62, 9p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-1342 from Tekhnika Kino I Televideniya, no. 10, pp. 38-41, 1961)
Unclassified report

DESCRIPTORS: *Video signals, *Video amplifiers, *Television equipment, *Magnetic recording systems, *Pulse amplifiers, Interference, Distortion, Reduction, Generators, Clipper circuits, Signal to noise ratio, USSR, Translations.

A method is presented of restoring quenching and synchronizing pulses in the full video signal after reading from magnetic tape. The block diagram and basic technical characteristics of the shaping device are presented. (Author)

AD-292 237 Div. 8, 5, 12
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIOELECTRONICS - THE NERVOUS SYSTEM OF A SPACESHIP,
by Konstantin Palatov. 16 Oct 62, 5p. (Trans. no. FTD-TT-62-1425 from Kommunist, no. 205, p. 4, 31 Aug 62)
Unclassified report

DESCRIPTORS: *Radio, *Radio equipment, *Electronics, *Electronic equipment, *Spaceships, USSR, Translations, Communication equipment, Space flight, Communication systems, Data transmission systems, Radio communication systems.

AD-292 302 Div. 8
(TISTP/TL) OTS price $2.60

California U., Los Angeles.
THE USE OF THE TECHNIQUE OF LINEAR BOUNDS FOR APPLYING THE DIRECT METHOD OF LIAPUNOV TO A CLASS OF NONLINEAR AND TIME VARYING SYSTEMS,
by R. A. Nesbit. 1962, 26p. incl. illus. 6 refs. (Theory paper no. 420)
(Grant AF-AFOSR 62-68)
Unclassified report

DESCRIPTORS: *Nonlinear systems, *Control systems, Inequalities, Stability, Functions, Special functions, Matrix algebra, Partial differential equations.

The stability of a class of systems is shown by the use of the basic theorems of the direct method. This set of inequalities defines a region, and if the nonlinear or time varying part of the system remains inside this region, then the stability of the system is assured. The usual methods of approximating the time response may be used, and thus this technique can be used to aid the design of control systems. The technique is applied to second and third order examples and is compared to the 'variable gradient' method of solving these problems. (Author)

AD-292 312 Div. 8
(TISTE/OHD) OTS price $8.10

Technical Research Group, East Boston, Mass.
THE WIDE FLARE HORN. A NOVEL FEED FOR LOW NOISE

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

BROADBAND AND HIGH APERTURE EFFICIENCY ANTENNAS, by Alan F. Kay. 2 Oct 62, 78p. incl. illus. tables, 6 refs. (Scientific rept. no. 2) (Contract AF 19(604)8057, Proj. 151) (AFCRL 62-757)
Unclassified report

DESCRIPTORS: *Antenna horns, *Antennas, Transmission lines, Broadband, Antenna radiation patterns, Mathematical analysis, Noise (Radio).

A novel feed for aperture antennas in excess of about 50 wavelengths diameter is described having low noise, broadband, and high aperture efficiency capabilities. The theory of these feeds is described and a comparison is made of measured and theoretical primary and secondary patterns of several feeds. (Author)

AD-292 314 Div. 8
(TISTP/JW) OTS price $1.10

United States Sonics Corp., Cambridge, Mass.
PIEZOELECTRIC CONVERTER INVESTIGATION.
Quarterly rept. no. 3, 1 Sep-30 Nov 62, by Carol Kolm. 30 Nov 62, 5p. incl. illus. (Contract AF 33(657)8282)
Unclassified report

DESCRIPTORS: *Electroacoustic transducers, *Piezoelectric transducers, Circuits, Ceramic materials, Electrical networks, Feasibility studies, Electronic circuits.

Two types of piezoelectric ceramics assembled as edgeclamped, bilaminar transducers have been tested in several sound fields up to 160 db. Efficiencies as high as 10 per cent have been achieved under resonant conditions indicating the feasibility of constructing a practical transducer for the conversion of high field sound into usable electrical energy over the frequency range of interest. (Author)

AD-292 321 Div. 8, 15
(TISTP/WH) OTS price $19.75

Autonetics, Downey, Calif.
DESCRIPTION AND COMPARISON OF COMPUTER METHODS OF CIRCUIT ANALYSIS,
by H. S. Scheffler and F. R. Terry. 30 June 61, 301p. incl. illus. tables (Rept. no. EM-6839)
Unclassified report

DESCRIPTORS: *Digital computers, *Electronic circuits, *Guided missiles (Strategic), *Control systems, *Probability, *Numerical methods and procedures, Reliability, Programming, Analysis.

Computer circuit-analysis techniques are discussed which are used to determine projected performances of newly-designed electronic circuits considering normal part-parameter variations. The analysis describes each component-variation circuit-analysis method in detail, applying it to a deficient sample circuit, showing how the method pinpoints circuit deficiencies, and furnishing problem circuits to be set up for each method. Additionally, flow charts and IBM 7090 programs for each of the methods appear in the Appendix. (Author)

AD-292 329 Div. 8
(TISTE/CRJ) OTS price $3.60

Microwave Lab., Stanford U., Calif.
COUPLED MODE THEORY OF ACOUSTIC WAVE AMPLIFIERS, by C. F. Quate. Feb 62, 35p. (ML rept. no. 889)
(Contract Nonr-22548, Proj. NR 373-361)
Unclassified report

DESCRIPTORS: *Audio amplifiers, *Piezoelectric crystals, *Acoustics, Piezoelectric materials, Electric fields, Theory, Propagation, Wave transmission, Mathematical analysis.

It has recently been demonstrated that acoustic waves can be amplified in CdS when the free carriers in the photoconductor drift through the crystal with a velocity somewhat faster than sound. The acoustic waves generate an electric field which couples to the carriers in piezoelectric materials. The coupled mode theory of interactions of this type is discussed. The propagation characteristics of the waves in the elastic media and the waves on the drifting carriers are changed when the normal modes in the two systems are weakly coupled with the piezoelectric field. With this coupling, and with the case where the diffusion current is less than the current of the bunched carriers, we find one forward wave growing exponentially and a second wave attenuating exponentially with distance. The boundary conditions are studied and show that the amplified wave is strongly excited by the elastic wave at the input. The analysis presented should be valid in the range of frequencies where the mean free path of the carriers is short compared to the acoustic wavelength. (Author)

AD-292 346 Div. 8
(TISTE/CRJ) OTS price $3.60

Motorola, Inc., Phoenix, Ariz.
DEVELOPMENT OF LOW NOISE - LOW DISTORTION TRANSISTOR.
Quarterly rept. no. 2, 15 Aug-15 Nov 62, by John E. Muschinske and Fred A. Rubi. 15 Nov 62, 30p. incl. illus. tables. (Contract NObsr-87438)
Unclassified report

DESCRIPTORS: *Transistors, *Semiconductors, Silicon, Noise (Radio), Distortion, Growth, Errors, Modulation, Measurement.

Work was directed toward development, evaluation and characterization of the XP-734, a PNP silicon large area device. The XP-734 exhibits noise figure at the high current level necessary for low distortion operation, which is very little increased over its low current value. Both noise figure and distortion measurements indicate the need for a higher frequency device to improve over-all performance. Tests on recently developed higher frequency devices indicate that improvement in both noise figure and distortion is possible with further device and process refinement. (Author)

AD-292 602 Div. 8
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN PROBLEMS IN THE THEORY OF MULTIVARIABLE LINEAR AUTOMATIC CONTROL SYSTEMS,
by S. I. Rybnikov. 7 Nov 62, 13p. 4 refs. (Trans. no. FTD-TT-62-1384 from Voprosy Avtomaticheskovo Regulirovaniya Dvizhushchikhsya Ob'yektov, No. 139, pp. 119-128, 1961)
Unclassified report

DESCRIPTORS: *Linear systems, *Automatic, *Control systems, Electrical networks, Synthesis, Functions, Matrix algebra, Operators (Mathematics).

All the problems which arise in connection with a single-variable control system, also arise in connection with a multivariable control system. In addition, the presence of several controlled variables, control elements, and controllers gives rise to a number of specific problems involving the analysis and maintenance within prescribed limits of the respective effects of the individual control circuits. Relationships are established which may be advantageous in the analysis and synthesis of multiple connected linear automatic deviation-control systems. (Author)

AD-292 607 Div. 8
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ABOUT AN INSTANCE OF AMPLITUDE ERROR DISCRETIZATION,
by Ya. P. Dragan and V. M. Mikhaylovskiy. 14 Nov 62, 6p. 1 refs. (Trans. no. FTD-TT-62-1364 from Dopovidi, AN Ukrayins'koyi RSR, No. 12, pp. 1578-1582, 1961)
Unclassified report

DESCRIPTORS: *Radio signals, *Sampling, *Errors, *Radiofrequency pulses, *Amplitude modulation, Pulse modulation, Communications theory, Telemeter systems, Moments.

In this study are analyzed and generalized previously obtained results for the known in practice telemetering cases where the sensing element is fed sinusoidal tension and the amplitude modulated sinusoid is discredited, and the reproduction of informational function is realized by averaging a straightened sequence of pulses within a certain selected time interval. The error originates when the pick up moments are not synphased with the carrying sinusoid. (Author)

AD-292 611 Div. 8, 16
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SAFETY MEASURES RECOMMENDED FOR WORK ON RADIO-FREQUENCY GENERATOR INSTALLATIONS,
by V. A. Krylov and A. P. Solovey. 19 Nov 62, 19p. incl. illus. tables (Trans. no. FTD-TT-62-339 from Bezopasnost' Truda Pri Rabote Na Ustanovkakh S Generatorami Energii Vysokikh i Sverkhvysokikh Chastot, Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo, Oborongiz, Moskva, pp. 3-17, 1961)
Unclassified report

DESCRIPTORS: *Radiofrequency generators, *Safety, *Radiation hazards, Translations, USSR, Radiation effects, Electric fields, Magnetic fields, Induction heating, Radiation tolerance, Tissues, Man.

Electromagnetic radio-frequency fields and x-rays have a harmful effect on the human organism. Since they are invisible and their effects are not detected by the sense organs, a very careless attitude on the part of workers to the dangers of radiation and an underestimation of its harmful effects on the body is observed. Information concerning the effects of radio waves on man and the precautionary measures against radiation by radio waves and soft x-rays is fragmentary and uncoordinated. An attempt has been made in this booklet to summarize this information and to present basic recommendations to ensure safe working conditions when dealing with radio-frequency generator installations. (Author)

AD-292 641 Div. 8, 6, 12, 1
(TISTE/CRJ) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF A BEACON ANTENNA SYSTEM WITH AUTOMATICALLY CONTROLLED DIRECTIVITY.
Quarterly progress rept. no. 2, 8 Sep-7 Dec 62, by S. Kavel and G. Rodriguez. 7 Dec 62, 45p. incl. illus. table.
(Contract DA 11-022-ORD-4222)
Unclassified report

DESCRIPTORS: *Guided missile antennas, *Airplane antennas, *Radar antennas, *Antenna radiation patterns, *Radar beacons, *Radar tracking, *Slot antennas, Ferromagnetic materials, Automatic, Phase shifters, Airborne, Electronic switches, Phase modulation, Signal-to-noise ratio, Sidebands, Radar interference, Control.

The source of interference nulls in the combined pattern of two or more radiating elements is described. It is shown that phase-modulation of the individual radiators can reduce the severity of the nulls. If suitable phase modulation waveforms are used, the nulls are completely eliminated. Sine-wave, linear, and square-wave phase modulation are compared. It is shown that sine-wave modulation creates fewer interfering sidebands than square-wave modulation. On the other hand, square-wave modulation appears useful for any number of interfering radiators, while sine-wave modulation is limited to three radiators. Switching between individual radiators is shown to give identical results as square-wave phase modulation. Experimental measurements of the radiation pattern of a 3-slot antenna on a 15 inch diameter cylinder and the effects of 180 degree phase shifts are presented. It is verified that the phase reversal interchanges maxima and minima for both linear and circularly polarized receiving antennas. (Author)

AD-292 730 Div. 8
(TISTE/CRJ) OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
STUDIES OF THE F-REGION BY THE INCOHERENT BACK-SCATTER METHOD,
by J. V. Evans. 24 July 62, 59p. incl. illus. tables, 63 refs. (Technical rept. no. 274)
(Contract AF 19(628)500)
(AFESD TDR 62-253) Unclassified report

DESCRIPTORS: *Ionospheric propagation, *Microwaves, *Radar signals, Electrons, Spectrographic analysis, Ions, Temperature, Density, Measurement, Mathematical analysis, Integral equations, Ionosphere, Scattering.

The Millstone Hill radar facility operated by Lincoln Laboratory has made measurements of the distribution of electrons in the F-region of the ionosphere by observing the weak incoherent back-scatter signal. These measurements were first made early in 1960 and were continued throughout 1961 on a routine basis at least once a week. All electron density profiles measured up to the end of 1961 are presented. Results of spectral analyses of the signals made early in 1962 are also given. The distribution of electrons

above the peak of the F-region has been a subject of special study. On the basis of the results obtained to date the conclusions reached are: (a) the scale height of the electron density increases with height, (b) the ion temperature is not very dependent on height, though it does show a marked diurnal variation, (c) the electron-to-ion temperature ratio is 1:1 during the hours of darkness, but during the daytime it increases to a peak value of approximately 1.6:1 around noon and (d) the scattering cross section for the electrons is close to the expected value when allowance is made for (c). (Author)

AD-292 794 Div. 8
(TISTE/PAR) OTS price $1.60

Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF AN E-BAND AMPLIFIER.
Quarterly technical note no. 7, 1 July-30 Sep 62, by E. W. Kinaman. 30 Sep 62, 11p. incl. illus. table.
(Contract AF 30(602)2422, Proj. 5573)
(RADC TDR 62-586) Unclassified report

DESCRIPTORS: *Microwave amplifiers, *Traveling wave tubes, *Band-pass filters, Extremely high frequency, Coupling circuits, Waveguides, Impedance matching, Waveguide filters, Spheres, Helixes, Electron beams, Cathodes (Electron tubes), Standing wave ratios, Measurement, Focusing, Diodes, Magnets, Test equipment, Test methods.

Research and development was continued on a low-noise E-band amplifier. The waveguide slot was reduced to a hole only twice the helix diameter and excellent coupling was achieved through the incorporation of a probe type extension of the helix. Measurements showed negligible coupling loss, relatively smooth insertion loss vs. frequency, and total tube loss from 35-45 db over the band. Larger YIG spheres were tested in an attempt to increase the instantaneous bandwidth and reduce the filter insertion loss. Results obtained were bandwidths in the range of 143 to 224 mc with an insertion loss of 1.6 to 2.4 db across the 70-79 gc band. Initial tests were also performed on the magnetic tuning circuit. (Author)

AD-292 910 Div. 8, 26
(TISTE/OHD) OTS price $5.60

Piezo Crystal Co., Carlisle, Pa.
PRODUCTION ENGINEERING MEASURE FUNDAMENTAL MODE CRYSTAL FOR FILTERS CR(XM-41)/U.
Quarterly rept. no. 5, 10 May-9 Aug 62, 9 Aug 62, 48p. incl. illus.
(Contract DA 36-039-sc-85956)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Manufacturing methods, *Crystal filters, High frequency, Crystals, Band-pass filters, Production, Experimental data, Test methods, Military requirements.

After establishing a definite set of procedures for manufacturing filter type crystals, groups were run at 10 mc and 15 mc. The 10 units on these two frequencies were completed and passed all test requirements. The 30 mc filter crystals were not passing the spurious requirements until the Co/Ci ratio was raised to 550 maximum. A temperature coefficient problem was noted on the cultured quartz 30 mc units, the cultured quartz units required a 2 to 3 minute increase in angle to keep them inside the tolerance for temperature drift. With the T.A.R. granted on the capacity ratio, the 30 mc units were completed and passed all tests prior to submission. (Author)

AD-292 952 Div. 8
(TISTE/OHD) OTS price $9.60

American Machine and Foundry Co., Alexandria, Va.
STANDARDIZATION STUDY OF COAXIAL SWITCHES.
Final development rept., 1 May-31 Dec 62. 31 Dec 62, 112p. incl. illus. tables.
(Contract NObsr-87418)
Unclassified report

DESCRIPTORS: *Electric switches, *Coaxial cables, *Standardization, Documentation, Standing wave ratios, Tables, Data, Test methods.

A study is described of the electromechanical coaxial (rf transmission line) switches, federal supply class 5985, used by the military departments. In an eight month period, the 470 types of coaxial switches in the military supply system were described, a proposed general specification and a sample detail specification were developed, and a proposed description pattern for defining switches in the federal catalog system was prepared. Much of the significant data was coordinated with cognizant military activities and industrial firms. A discussion of the procedures used, and the conclusions and recommendations are included. (Author)

AD-292 989 Div. 8
(TISTP/JW) OTS price $5.60

Case Inst. of Tech., Cleveland, Ohio.
STUDY OF CONTROL OF APERTURE FIELDS.
Final rept., June 58-Oct 63.
31 Oct 62, 51p. incl. illus. refs. (Scientific rept. no. 35)
(Contract AF 19(604)3887, Proj. 5635)
(AFCRL 62-932) Unclassified report

DESCRIPTORS: *Antennas, *Dielectrics, Electrical networks, Measurement, Instrumentation, Surfaces, Diffraction, Control systems.

A summary of the problems and principal results obtained in the areas of surface current measurements, antenna pattern synthesis, artificial dielectric media, and network synthesis, during the four year period June 1958 to October 1963 is presented. (Author)

AD-292 990 Div. 8
(TISTP/JW) OTS price $1.60

Case Inst. of Tech., Cleveland, Ohio.
(No title).
Quarterly progress rept., 1 Jan-31 Mar 62. June 62, 6p. incl. illus. refs. (Scientific rept. no. 33)
(Contract AF 19(604)3887, Proj. 5635)
(AFCRL 62-919) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Antennas, *Dielectrics, Diffraction, Reflectors, Electrical networks, Matrix algebra.

The dispersion relation for waves propagating obliquely through a strip medium with a non-orthogonal lattice structure is given together with some typical numerical results. Abstracts of two papers pertaining to N-port network synthesis are also included. (Author)

AD-292 991 Div. 8
(TISTP/JW) OTS price $2.60

Case Inst. of Tech., Cleveland, Ohio.
(No title).
Quarterly progress rept., 1 Apr-30 June 62.
July 62, 18p. incl. illus. refs. (Scientific rept. no. 34)
(Contract AF 19(604)3887, Proj. 5635)
(AFCRL 62-920) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Antennas, *Dielectrics, Diffraction, Reflectors, Electrical networks, Matrix algebra.

A study of reactive energy and Q associated with antennas is presented. For an aperture in a conducting screen expressions for radiated power, stored reactive energy and Q are given. A theorem on the frequency sensitivity of the aperture susceptance is presented. Also a method of optimizing the aperture field is given. A general method of evaluating antenna Q is developed and explicit results for the Q of spherical cylindrical modes obtained. (Author)

AD-292 992 Div. 8
(TISTW/RD) OTS price $5.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF BROAD-BAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
Monthly progress rept., 1-31 Oct 62,
by Paul F. Mohrbach and Robert F. Wood.
31 Oct 62, 42p. incl. illus. tables (Rept. no. P-B1981-4)
(Contract N178-8087)
Unclassified report

DESCRIPTORS: *Radiofrequency, *Electromagnetic waves, *Ferrites, *Detonators, Broadband, Dielectrics, Low frequency, Iron compounds, Carbonyl radicals, Transmission lines, Attenuation, Absorption, Hazards.

A discussion of the parameters required to optimize the attenuating ability of samples made from carbonyl iron is presented. Analysis of the data indicates that the inability to increase the permeability of the coated iron above 10 is limiting the attenuation. While the permeability of the pure carbonyl iron is over 1000, no success has been achieved in approaching this value when the particles are coated. The use of a presintering operation in the fabrication of ferrites has controlled shrinkage to within a reasonable degree. Attenuation measurements of Ni-Zn ferrites have been made. Maximum attenuation obtained is in the order of 7 db/cm at 500 Mc. Steps by which attenuation can be improved are discussed. Development of a plastic binder containing barium titanate has been continued. A dielectric constant of 30 is the highest value yet obtained. Voltage breakdown is about 150 volts per mil. Two ferrite samples with insulating coatings (K = 8000) applied to the outer periphery were evaluated. Both samples showed an appreciable decrease in attenuation which was not expected. (Author)

AD-293 094 Div. 8
(TISTE/PAR) OTS price $1.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
35-KMC BEAM INTERACTION STUDY.
Interim engineering rept. no. 3, 20 Sep-20 Dec 62,
by C. E. Enderby and R. M. White. 20 Dec 62, 13p. incl. illus. table (Rept. no. TIS R62ELM 233-3)
(Contract AF 33(657)8360, Proj. 4156)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Electronic circuits, Extremely high frequency, Electron guns, K band, Waveguide couplers, Electron beams, Impedance, Test equipment, Propagation, Electric fields, Magnetic fields, Waveguides, Magnetrons, Tests.

A brief discussion is given of the circuit to be used in the traveling wave tube. This discussion includes the basis for the choice of the circuit, and of the operating parameter of the tube using this circuit, such as gain, bandwidth, and control of oscillations. The coupler to be used with these circuits and the electron guns to be used in the tube also are discussed. A tube to test these circuits was designed; it will operate at 30 gc and give a small-signal gain of about 20 db. The circuit chosen for use in this tube is discussed. The coupler for use in this circuit also is discussed. The coupler produces a better match to both the +- and ++ modes. Two electron guns were built. One gun has a variable-perveance hollow beam. It has been tested at low voltages to allow visual observation of the beam size and shape, and also at the operating voltage of the tube to check for transmission through a dummy circuit and to detect any possible arcing or breakdown at these voltages. The second gun is a conventional-beam Pierce gun; it has been tested at low voltages. (Author)

AD-293 103 Div. 8, 15
(TISTP/WH) OTS price $7.60

Coordinated Science Lab., U. of Illinois, Urbana.
REALIZABILITY CONDITIONS OF SINGLE-CONTACT NETWORKS,
by Shu-Park Chan. Dec 62, 72p. incl. illus. tables, 16 refs. (Rept. no. R-158)
(Contract DA 36-039-sc-85122, Proj. 3-99-01-002)
Unclassified report

DESCRIPTORS: *Switching circuits, *Electrical networks, *Algebras, *Topology, *Matrix algebra, Functions.

A selected set of necessary realizability conditions are derived from which a testing method is developed, so that one can apply it to a given function either to detect its nonrealizability or to simplify it before known synthesis procedures are employed. This investigation also shows that there exist certain classes of functions. They can be detected by the testing methods developed, as shown by various examples. The non-tree matrices and the nonrealizable matrices are investigated. Also the correlations between the non-tree matrices and the nonrealizable functions are given and are verified by examples which illustrate the reasons for their nonrealizability. (Author)

AD-293 145 Div. 8
(TISTE/CRJ) OTS price $1.60

Corning Glass Works, Bradford, Pa.
NF RESISTOR FACTORIAL LOAD LIFE TEST.
Interim development rept. Sep 62-Jan 63,
by D. C. Thompson. 3 Jan 63, 16p. incl. illus. tables.
(Contract NObsr-87385, Proj. SR008-0305 T-9601)
Unclassified report

DESCRIPTORS: *Glass resistors, Life expectancy, Reliability, Acceleration, Tin compounds, Oxides, Resistors, Switching circuits, Test equipment.

Tests were conducted to obtain failure rate data and acceleration factor data on NF glass hermetically sealed tin-oxide resistors in sufficient detail to be meaningful to US Navy technical personnel and to industrial design engineers. The major portion of the present effort was expended toward completion of activities leading up to installation of mounted and wired test boards in the ovens. The test circuit was altered to obtain faster component delivery and to afford increased circuit reliability. Considerable effort was started in providing proper processing procedures and in setting the resistor measurement equipment in good order. The 10,000 hour test was started and approximately 500 hours of test time was accumulated on the resistors. (Author)

AD-293 146 Div. 8, 26
(TISTE/OHD) OTS price $5.60

Melpar, Inc., Falls Church, Va.
PLANAR INTEGRATION OF PARTS AND SOLID CIRCUITS INTO THIN-FILM UNITS.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 62, by H. E. Culver, L. G. Davies and others. 31 Oct 62, 50p. incl. illus. tables.
(Contract DA 36-039-sc-89109, Proj. 3A99-15-002)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Electric connectors, *Packaged circuits, Wetting agents, Vapor plating, Tensile properties, Plasticity, Resins, Vacuum apparatus, Manufacturing methods, Thin films, Metal films.

The results of the completed wettability tests are shown. The effect of the vacuum evaporation conditions on the various bridging materials was evaluated. No effect on some of the materials was in evidence. The bonding strength of the bridging materials was evaluated and the results given. A description of two basic approaches to the component mounting problem is given. The methods are referred to as the metering and the filling method. The intraconnection mask and a substrate with the evaporated intraconnection pattern is shown. Several successful moisture resistance samples were prepared. A discussion is included on a means for alleviating the problem of migration and shadowing. The basic requirements for a thin metal film interconnection are discussed. Results of tests for adhesion of aluminum and nichrome-copper deposited films to various materials are given. Evidence indicates that the tensile strength of thin metal films is considerably higher that it is for the bulk metal. (Author)

AD-293 149 Div. 8
(TISTE/CRJ) OTS price $2.60

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON TECHNIQUES FOR LIGHT MODULATION DETECTION.
Interim engineering rept. no. 2, 1 Oct-30 Dec 62, by S. E. Sobottka and R. Frost. 30 Dec 62, 21p. incl. illus. 1 ref. (Rept. no. W-J 63-610R8)
(Contract AF 33(657)8996)
Unclassified report

DESCRIPTORS: *Phototubes, *Microwave equipment, Electron guns, Light, Modulation, Cathodes (Electron tubes), Oxygen electrodes, Silver electrodes, Cesium, Microwaves, Electric fields, Magnetic fields, Electrostatic fields, Electron lenses, Focusing, Photosensitivity, Helixes, Electron beams, Diodes, Manufacturing methods.

Effort was continued on a study of convergent gun microwave phototubes. Present work was devoted principally to development of photocathode fabrication, and acquisition of light modulator components. Two procedures for fabricating Ag-O-Cs semitransparent photocathodes were studied, with considerably higher sensitivities resulting from one than the other. A new gun design was developed, a confined-flow type instead of a shielded-cathode type. This gun appears to be able to satisfy the condition of equal transit times for all electrons better than any other. Most of the components for a microwave modulated light source were fabricated or acquired; assembly and operation will soon take place. (Author)

AD-293 153 Div. 8
(TISTP/TL) OTS price $1.60

Coordinated Science Lab., U. of Illinois, Urbana.
PROPERTIES OF SOME ALL-POLE TRANSFER FUNCTIONS, by D. A. Calahan. 1962, 10p. illus. 6 refs.
(Contract DA 36-039-sc-85122; Grant AF-AFOSR 62-126)
Unclassified report

DESCRIPTORS: *Electrical filters, *Low pass filters, *Functions, *Polynomials, Differential equations.

The simplicity in realizing all-pole functions and their relative insensitivity to element change has caused a study of such transfer functions with both Tchebycheff and weighted passband responses to be made. Certain closed form expressions associated with these functions are found. A simple relationship between the residues at the poles of a Tchebycheff all-pole transfer function and the poles themselves is derived. A variation on the work of Bennett, Helman, and others is shown to yield an all-pole function with weighted passband response. (Author)

AD-293 197 Div. 8
(TISTE/OHD) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS PROGRAM. OPTICAL MASER STUDIES.
Semiannual technical rept., 1 Jan-30 June 62, by M. Birnbaum. 15 Nov 62, 23p. incl. illus. tables, 13 refs. (Rept. no. TDR-69(2250-22)TR-1)
(Contract AF 04(695)69)
(DCAS TDR 62-203) Unclassified report

DESCRIPTORS: *Lasers, Gallium compounds, Oxides, Ruby, Fluorescence, Zone melting, Solid state physics, Glass, Neodymium.

Effort was expended in a fundamental study of useful or potentially useful materials in optical maser technology. Very small crystals of beta-Ga2O3 and powders of alpha- and beta-Ga2O3 have been prepared, and preliminary observations of their fluorescence was made. Many solid state lasers, when operated very close to threshold, exhibit an output which consists of a regularly-spaced series of spikes with an exponentially-damped amplitude. The phenomenological theory of Statz and deMars predicts these effects. A comparison of the theory and experimental data

is given for a three-level system (ruby) and a four-level system (Nd(3+) in glass). A more exact treatment of the rate equations for the three-level system is in better accord with the experimental results for ruby. In the case of the four-level system, the observations are believed to be the first of this type for the Nd(3+) glass laser. The results are in qualitative agreement with the theory. (Author)

AD-293 216 Div. 8
(TISTE/OHD) OTS price $1.60

Electronic Defense Labs., Mountain View, Calif.
OCTAVE-TUNABLE TUNNEL DIODE OSCILLATORS,
by William L. Shelton and Wayne L. Frederick.
19 Oct 62, 12p. incl. illus. (Rept. no. EDL-M476)
(Contract DA 36-039-sc-87475)
Unclassified report

DESCRIPTORS: *Microwave oscillators, *Diodes, *Semiconductors, S band, Microwave equipment, Tuning devices, Microwave probes, Cavity resonators, Broadband.

The design and characteristics of an octave-tunable tunnel diode oscillator are presented. The oscillator has reasonably constant output power and a straight-line tuning curve. The principal elements of the oscillator are described and applications for tunnel diode oscillators are presented. (Author)

AD-293 223 Div. 8
(TISTE/OHD) OTS price $3.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
RECENT BACKSCATTER STUDIES ON TWELVE MEGACYCLES,
by P. R. Arendt and A. Papayoanou. Oct 62, 28p. incl. illus. tables, 6 refs. (AERDL technical rept. no. 2317)
(DA Proj. 3A99-25-004-01)
Unclassified report

DESCRIPTORS: *Ionospheric propagation, *Propagation, Radio equipment, Electromagnetic wave reflections, High frequency, Terrestrial magnetism, Antenna radiation patterns, Mathematical analysis, Theory, Experimental data, Radiofrequency pulses.

A backscatter program was initiated because of the reports on the magnetic duct experiment of the central radio propagation laboratory. Although the long-delayed echoes of this experiment were not detected, there were found a number of other delayed echoes which merit interpretation. Experiments were conducted at various times of day and night, and also during 24-hour periods. A theoretical explanation is given for ducted propagation along striated irregularities in the ionosphere. (Author)

AD-293 261 Div. 8, 25, 26
(TISTE/CRJ) OTS price $2.60

Knights, James, Co., Sandwich, Ill.
VHF QUARTZ CRYSTAL UNITS CR-(XM-38)/U 150 MC TO 200 MC.
Formal rept. no. 4, 1 July-30 Sep 62 on Production Engineering Measure.
30 Sep 62, 20p. incl. illus. table.
(Contract DA 36-039-sc-85973)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal oscillators, *Manufacturing methods, *Harmonic oscillators, Very high frequency, Production, Crystal holders.

Design of 9th overtone units is discussed, and the manufacturing specifications for an experimental run are given in detail. Emphasis is placed upon control of the plated electrodes. Miscellaneous data on the 9th overtone behavior of units without frequency plating and on the inductance of short, McCoy tab-clip mounts, is given. A final comment on mechanical difficulties with the AN/TSM-15 is made. (Author)

AD-293 271 Div. 8, 26
(TISTE/CAM) OTS price $6.60

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO INCREASE TRANSISTOR RELIABILITY.
Quarterly progress rept. no. 1, 1 May-31 July 62,
by James R. Reese, Stratt Georgoulis and others.
31 July 62, 39p. incl. illus. tables.
(Contract DA 36-039-sc-86730)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Production, Processing, Tables, Germanium, Silicon, Diffusion, Test methods, Test facilities, Test equipment, Quality control, Data, Analysis, Reliability.

Effort was continued on the production engineering measure to increase transistor reliability. The major areas of engineering activity during the report period were on the following process steps: (1) epitaxial growth control; (2) surface preparation of substrate for growth; (3) epitaxial continuity control; (4) diffusion control to eliminate resistivity; (6) cleaning techniques to obtain optimum surface condition for all fabrication processes; (10) evaporation control; and (11) mesa and dice cutting. (Author)

AD-293 276 Div. 8
(TISTE/OHD) OTS price $9.60

Sylvania Electric Products, Inc., Waltham, Mass.
VERY LOW FREQUENCY ANTENNA TECHNIQUES.
Final rept. vol. 2.
9 June 62, 117p. incl. illus. tables (Rept. no. F-1013-1; Document no. 149-3-)
(Contract AF 30(602)2496)
(RADC TDR 62-326, vol. 2)
Unclassified report

DESCRIPTORS: *Antennas, *Broadband, *Very low frequency, *Slot antennas, Tuned circuits, Switching circuits, Capacitors, Radiofrequency coils, Frequency shift keyers, Transients, Radio communication systems, Mathematical analysis, Cavity resonators, Standing wave indicators, Waveguide slots, Impedance, Measurement.

The transient response of simple RLC circuits to pulsed carriers is determined by circuit Q or by the ratio of R to L or C. This consideration does not apply to configurations where it is possible to insert or remove a reactive element with the appropriate amount of stored energy at instants when the other reactive element has zero stored energy. This permits instantaneous switching of the output between zero and the conventional steady state condition as often as once in each cycle of the carrier. Other subjects include the admittance of a rectangular slot which is backed by a rectangular cavity and excited by a current source connected across its

center, slot antenna impedance measurements by means of measuring null widths, and the integral equation for the electric field distribution in the slot is solved for the longitudinal field variation by Hallen's iteration method.

AD-293 290 Div. 8, 25, 24, 14
(TISTM/EJH) OTS price $1.10

Polymer Research Inst., U. of Mass., Amherst.
THE USE OF A LASER AS A LIGHT SOURCE FOR PHOTOGRAPHIC LIGHT SCATTERING FROM POLYMER FILMS,
by Marion B. Rhodes, Daniel A. Keedy and Richard S. Stein. 25 June 62, 5p. incl. illus.
(Technical rept. no. 46)
(Contract Nonr-335701, Proj. NR 356-378)
Unclassified report

DESCRIPTORS: *Lasers, *Polymers, *Optics, *Photographic film, Laboratory equipment, Light, Scattering, Sources, Ethylenes, Ruby, Films.

A light-weight portable self-contained laser and power supply which produces a 0.1 joule plane polarized pulse having wavelength 6943A from a 90 degree cut 2 in. x 1/4 in. ruby crystal excited by a 400 joule pulse from two xenon flash lamps was used as a light source for this study. A V sub v polarized scattering pattern from a mil thick medium density polyethylene film obtained with a single flash of the laser of duration about 500 micron sec is compared with a similar picture for the same sample requiring a 4.5 hour exposure with conventional apparatus. The laser pattern is somewhat larger in size because of the longer wavelength. Pictures were obtained in single flashes equivalent to 4 day conventional exposures. It is possible by taking a number of pictures in succession of follow time dependent processes such as crystallization rates, orientation relaxation, annealing and changes accompanying dynamic strain. (Author)

AD-293 430 Div. 8, 25
(TISTB/WH) OTS price $5.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
INVESTIGATION OF HIGH FREQUENCY PROPAGATION IN THE IONOSPHERE USING SATELLITE TRANSMISSIONS.
Final rept., 1 July 59-30 Apr 62,
by W. J. Ross and A. H. Waynick. 31 May 62, 55p. incl. illus. tables.
(Contract AF 33(616)6157)
Unclassified report

DESCRIPTORS: *Ionosphere, *High frequency, *Propagation, *Satellite vehicles, *Telemeter systems, *Radio signals, Communication systems.

Work performed in the study of radio wave propagation through the ionosphere using satellite transmitters is summarized. Following an introductory section in which many of the basic features of these studies are discussed, an account is given of the detailed investigations in the several areas. These are loosely defined by the experimental technique appropriate to each, and each section in fact contains a description of several lines of investigation. (Author)

AD-293 447 Div. 8
(TISTM/EJH) OTS price $4.60

TYCO Labs., Inc., Waltham, Mass.
HIGH Q VARACTOR DIODES.
Quarterly rept. no. 3, 1 Sep-30 Nov 62. 31 Dec 62, 21p. illus. tables, 3 refs.
(Contract NObsr-87340, Proj. SR-0080301)
Unclassified report

DESCRIPTORS: *Diodes, Gallium compounds, Arsenic compounds, Phosphorus compounds, Growth, Packaging, Manufacturing methods, Electrical properties, Voltage, Resistance, Gold plating, Microwaves, Measurement, Semiconductors.

Primary device effort was directed toward the three main areas: (1) Detailed 1 mc capacity measurements and microwave Q measurements were made to verify the dependence of capacity and Q on bias voltage. Great care must be exercised to keep losses low enough to obtain meaningful values of Q. (2) The relationship between junction capacity and series resistance was studied. It was found that a residual resistance, not associated with the spreading resistance, degrades the Q for varactors with relatively large capacities. (3) A cone was substituted for the contact whisker to reduce the inductance. A reliable method to make contact to the N-side of the GaAs was developed by plating gold directly to the material. (Author)

AD-293 460 Div. 8
(TISTE/CRJ) OTS price $1.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
STUDIES IN TRANSISTOR-RC NETWORK SYNTHESIS.
Final rept., 1 Dec 61-30 Nov 62.
30 Nov 62, 7p. 3 refs.
(Grant AF-AFOSR 62-126 A)
Unclassified report

DESCRIPTORS: *Transistors, *Electrical networks, Sensitivity, Diodes, Electronic equipment, Synthesis.

AD-293 468 Div. 8, 16
(TISTB/MD) OTS price $.75

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
A PRELIMINARY STUDY OF THE SERVO PROPERTIES OF THE GASTROCNEMIUS MUSCLE OF THE CAT.
Final rept. on Research on the Logical Structure and Function of the Nervous System and Biological Information Handling Systems and Their Functional Analogs,
by Lothar O. Hoeft and Virgil E. Sackschewsky. Nov 62, 18p. incl. illus. table, 2 refs.
(Projs. 7232 and 7233)
(AMRL TDR 62-108) Unclassified report

DESCRIPTORS: *Servomechanisms, *Muscles, Cybernetics, Stimulation, Mathematical analysis, Analog computers, Simulation, Feedback, Cats, Servo systems, Reflexes, Constriction, Physiology, Control.

A variable impedance muscle stimulator has been developed for use in investigating the control functions of biological servomechanisms. Preliminary investigations have been concerned with the properties of the gastrocnemius muscle reflex of the cat, which represents a simple servosystem. These investigations have shown that the muscle reflex seems to be dependent for the most part on only a few parameters: resting tension, amplitude of the stimulus, and rate of onset of the stimulus. More complicated systems, in particular some of the control systems of man, will be investigated in the future. This type of study is useful to systems design engineers,

because biological servomechanisms offer an infinite number of prototypes that can be investigated to find out how to build accurate, reliable servomechanisms able to maintain their control function while operating into a wide range of loads. (Author)

AD-293 478 Div. 8
(TISTE/CAM) OTS price $2.60

Micromega Corp., Venice, Calif.
C-BAND, WIDEBAND SOLID STATE AMPLIFIER.
Quarterly technical note no. 4, 15 Mar-15 June 62, by Harvey M. Endler and Conrad E. Nelson.
15 June 62, 22p. incl. illus.
(Contract AF 30(602)2525, Proj. 5573)
(RADC TDR 62-593) Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Tuned amplifiers, C band, Broadband, Microwave amplifiers, Tuning circuits, Cavity resonators, Electronic circuits, Electrostatic capacitance, Negative resistance circuits, Mathematical analysis, Noise (Radio), Reduction, Experimental data, Solid state physics.

Effort was continued to develop two experimental models of a low noise parametric amplifier. The first is a fixed tuned amplifier, broadband from 4000 to 6000 mc; the second amplifier is electronically tunable from 4000 to 6000 mc. The best results obtained thus far for the broadband unit are 900 mc bandwidth at 12 db gain, or about 600 mc bandwidth at 16 db gain. The noise figure of the paramp-circulator remains under 3.5 db. The electronically tunable amplifier can be swept over as much as 1000 mc with fairly uniform gain characteristics. A good noise figure was not obtained over this wide a range, 600 mc being the limiting range over which the noise figure was kept under 3.5 db. (Author)

AD-293 612 Div. 8, 26
(TISTE/CRJ) OTS price $4.60

General Bronze Corp., Garden City, N. Y.
DEVELOPMENTAL PROGRAM FOR THE FABRICATION AND TESTING OF SEVEN CONVOLUTION ELECTRON BEAM WELDED SERPENTINE LIGHTWEIGHT WAVEGUIDES.
Interim development rept., Mar-Dec 62,
20 Dec 62, 49p. incl. illus.
(Contract NObsr-85320)
Unclassified report

DESCRIPTORS: *Waveguides, *Electron beams, *Manufacturing methods, Magnesium compounds, Silicates, Electrical properties, Standing wave ratios, Attenuation, Production, Microwave equipment, Measurement, Welding.

Efforts are being made to determine the most suitable material, investigate the feasibility of fabrication, fabricate, and electrical test assemblies of a serpentine waveguide configuration having a minimum weight reduction of 50% of standard aluminum waveguide. Electrical measurements were performed for VSWR and attenuation. Results for the attenuation of the specially fabricated waveguide sections was found to be of the same order of magnitude as the copper or brass standard waveguide. (Author)

AD-293 629 Div. 8
(TISTW/RD) OTS price $8.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
PRINTED CABLES AND CONNECTORS.
Development rept. no. 3.
18 Feb 60, 90p. incl. illus. tables (Rept. no. DG-TR-4-60)
Unclassified report

DESCRIPTORS: *Printed circuits, *Electric cables, *Electric connectors, Installation.

This report presents the further developments of the printed cables and connectors. The materials and their features are reviewed and compared with other applicable products. From this comparison conclusions may be drawn as to the advantages of these materials. The product details discussed provide useful information for manufacturers and customers. Mechanical and electrical characteristics of printed cables are outlined and test results are discussed and graphically presented. A complete section of the report establishes requirements for connectors and the necessary application and functional data. Installation, routing, cable and preparation, and fastening techniques are suggested which demonstrate the application and service capabilities of printed cables. Proposals are submitted for printed cable standardization. A program of this type would provide simplicity of manufacture, development of new uses, eliminate complex installations and subsequently, reduce time and material costs. In summarizing the report, various advantages of the printed cable are established. Time, weight, volume and installation simplicity are compared with round wire gage applications and the results of testing verify the conclusions that printed cabling is a production necessity in the future planning of Systems concepts. (Author)

9. FLUID MECHANICS

AD-291 962 Div. 9, 1
(TISTA/FRL) OTS price $4.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SOME EFFECTS OF FORWARD SPEED ON THE PERFORMANCE OF AIR CUSHION VEHICLES,
by J. O. Helgesen. Nov 62, 39p. incl. illus. tables, 7 refs. (Memo. no. RM-218)
(Contract DA 44-177-tc-708)
Unclassified report

DESCRIPTORS: *Flying platforms, Semispan models, Wind tunnel models, Airspeeds, Aerodynamic configurations, Model tests, Pressure, Load distribution, Drag, Composite wings, Pitch, Lift, Moments, Aerodynamics, Mathematical analysis, Ground effect.

The effects of forward speed on air cushion vehicle performance are presented. It is shown that at a given forward velocity (dependent on height and mass flow) the forward jet is blown rearward. At higher velocities considerable performance improvement could be attained by turning off this jet. (Author)

AD-292 016 Div. 9, 30
(TISTA/FRL) OTS price $5.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
SHOCK TUNNEL STUDIES OF THE AERODYNAMICS OF ATMOSPHERIC ENTRY,
by W. R. Warren, E. M. Kaegi and others. May 62, 50p. incl. illus. tables, 36 refs. (Rept. no. R62SD56)
Unclassified report

Division 9 - FLUID MECHANICS

DESCRIPTORS: *Shock tubes, *Guided missile noses, Shock waves, Re-entry vehicles, Test methods, Pressure, Heat transfer, Hypersonic flow, Boundary layer, Lift, Piezoelectric gages, Resistance thermometers, Hypersonic wind tunnels, Wind tunnel models, Model tests, Hypersonics, Atmosphere entry, Instrumentation, Re-entry aerodynamics.

Shock tunnel studies of the aerodynamic problems of current and future atmospheric entry vehicles are presented. Five major test instrumentation techniques are used to measure the following types of model data: (1) surface pressure distributions, through the use of small piezoelectric crystal gages and special mounting and calibration techniques, (2) surface heat transfer distributions, through the use of thin film resistance thermometers (quantitative) and scorch models (qualitative), (3) aerodynamic forces and moments, through the use of the optical tracking of light models that are allowed to fly freely in the test flow, (4) flow field geometries through the use of high speed schlieren and shadowgraph techniques, and (5) boundary layer flow directions, inferred from surface oil streak studies. Typical experimental results are presented and discussed. (Author)

AD-292 018 Div. 9, 30
(TISTA/FRL) OTS price $4.60

Bell Aerosystems Co., Buffalo, N. Y.
A NEW APPROACH TO SAFE FLIGHT FLUTTER TESTING,
by Melvin B. Zisfein and Benjamin B. D'Ewart.
Sep 60, 41p. incl. illus.
(Contracts AF 49(638)380 and AF 49(638)749)
(AFOSR TN 60-1027)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Flutter simulators, Tests, Load distribution, Model tests, Simulation, Wind tunnel models, Stabilization systems, Exhaust gas ejectors, Jet mixing flow, Gas generating systems, Jets, Air foils, Flutter, Aerodynamics, Aviation safety.

A method is presented for flight flutter testing employing a jet device to simulate the force effects of mass and to create thereby an apparent change in the mass distribution of an aerodynamic surface. This apparent mass change can be easily manipulated to make flutter come or go, and can therefore be used as a safe, fail safe, positive, flight flutter test device. A discussion of the basic principles of jet mass and its effect on flutter, and a description of the design details of two jet mass prototypes and a wind tunnel flutter model are presented. (Author)

AD-292 047 Div. 9, 25
(TISTP/JW) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
LAMINAR MIXING OF TWO PARALLEL STREAMS IN THE PROXIMITY OF A SEMI-INFINITE FLAT PLATE,
by Kaoru Toba. Sep 62, 23p. incl. illus. 9 refs.
(PIBAL rept. no. 641)
(Grant AF-AFOSR-1-63, Proj. 9781-01)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, Fluid flow, Velocity, Shear stresses, Surfaces, Deflection, Viscosity, Mixtures.

The laminar mixing of two parallel streams in the vicinity of a semi-infinite flat plate is studied. Attention is confined to the flow field upstream of the merging of the boundary layer flow and the mixing layer flow, where a non-viscous core can be assumed to separate these viscous regions. The relative position of two regions corresponds to the lateral deflection of the interface streamline and is uniquely determined by the compatibility condition for the first-order-induced pressure. An approximate but simple method of evaluating the velocity and shear on the interface streamline for free mixing problems is presented and its application to the present problem is discussed. (Author)

AD-292 177 Div. 9, 15
(TISTP/JW) OTS price $9.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
THE EQUATIONS OF FLUID MECHANICS EXPRESSED IN CURVILINEAR COORDINATES.
Master's thesis,
by Bradley Sutter. Aug 62, 96p. incl. illus. 4 refs. (Rept. no. GAE/ME/62-4)
Unclassified report

DESCRIPTORS: *Fluid flow, *Fluid mechanics, *Equations, Stresses, Viscosity, Energy, Theses, Tensor analysis.

The applied science of fluid mechanics makes use of three basic equations to analyze and predict the state of a fluid in motion. These equations are the equations of motion, energy, and continuity. In most flow problems, these equations cannot be solved, or are very difficult to solve, unless they are expressed in terms of a coordinate system which conforms to the surface of the duct or body which shapes the flow. This report utilizes the methods of tensor analysis to transform the basic equations from their Cartesian forms to expressions in ten orthogonal curvilinear coordinate systems. The derivation process is outlined, and the final results are tabulated for each of the coordinate systems. Although this report assumes a Newtonian fluid model, the viscous stress components are listed separately so that, given the proper expressions for the viscous stress components, the results may also be applied to a non-Newtonian fluid. (Author)

AD-292 179 Div. 9
(TISTA/SEB) OTS price $6.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF THE EFFECTS OF INJECTING AIR THROUGH ONE WALL OF AN OVEREXPANDED, TWO-DIMENSIONAL NOZZLE.
Master's thesis,
by Edwin M. Anderson, Jr. Aug 62, 54p. incl. illus. tables, 9 refs. (Rept. no. GAE/ME/62-1)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, Air, Gas flow, Separation, Schlieren photography, Pressure, Shock waves, Analysis, Effectiveness, Injectors, Test methods, Tests, Theory, Theses, Gases, Supersonic nozzles, Aerodynamics, Injection.

Premature separation was studied of the flow of an overexpanded supersonic exhaust nozzle when caused by the injection of gas through the divergent wall. The nozzles were formed by placing contoured blocks between two glass plates. Cold air at 190 in. Hg. abs. was used for the main and injected streams. The flow was visually studied with a Schlieren apparatus and a survey

of static pressures was made along the surface of each block. Premature separation occurred with an oblique shock attached to the wall slightly ahead of the location of injection. The rate of injection required is a minimum when the injection is directed counter to the main stream. The rate can be further reduced if the injection is spread over an area of the wall immediately ahead of the overexpanded separation point. (Author)

AD-292 189 Div. 9, 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE TURBULENT BOUNDARY LAYER OF A GAS ON A PERMEABLE WALL,
by S. S. Kutateladze and A. I. Leontev. 23 Oct 62, 19p. incl. illus. 18 refs. (Trans. no. FTD-TT-62-1315 from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki no. 1, pp. 51-60, 1962)
Unclassified report

DESCRIPTORS: *Turbulent flow, *Boundary layer, Gases, Translations, Permeameters, Shielding, Cooling, Vapors, Condensation, Gas flow, High temperature research.

AD-292 197 Div. 9
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE FLOW OF GAS NEAR THE STAGNATION POINT OF A BLUNT BODY WITH A FINITE RATE OF EXCITATION OF VIBRATIONAL DEGREES OF FREEDOM,
by I. N. Murzinov. 30 Oct 62, 9p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-1313 from Akademiya Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, no. 6, pp. 33-36, 1961)
Unclassified report

DESCRIPTORS: *Fluid flow, *Blunt bodies, Excitation, Supersonic flow, Velocity, Shock waves, Relaxation time, Translations, Gases.

The influence of relaxation caused by excitation of vibrational degrees of freedom of a diatomic gas on flow in the region of the stagnation point of a blunt axisymmetric body moving at supersonic velocity is examined. The approximate solution of the problem is found. The parameters of the gas near the axis of symmetry between the body and the shock wave are determined. Using certain assumptions the solution was obtained in final form. The results are given on the influence of relaxation on the separation of a shock wave as a sphere moves in air, considered to be a mixture of molecular oxygen and nitrogen. (Author)

AD-292 225 Div. 9, 25
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NONEQUILIBRIUM FLOW OF AIR IN NOZZLES,
by S. I. Anisimov and G. S. Romanov. 16 Oct 62, 10p. 11 refs. (Trans. no. FTD-TT-62-1278 from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, no. 1, pp. 76-81, Jan-Feb 62)
Unclassified report

DESCRIPTORS: *Air, *Nozzles, *Gases, Gas flow, Dissociation, Nitrogen, Oxygen, Theory, Recombination reactions, Nitrogen compounds, Oxides, Reaction kinetics.

Certain problems concerning the kinetics of establishing equilibrium between progressive and inert degrees of freedom of molecules at high temperatures in the air are evaluated. The obtained equations which describe monodimensional flow of air during nonequilibrium oscillations and oxygen and nitrogen dissociations, are given. Simple boundary cases were investigated. (Author)

AD-292 300 Div. 9, 25
(TISTP/JW) OTS price $2.60

Johns Hopkins U., Baltimore, Md.
GENERATION OF A ''STRONGLY'' SWIRLING JET AND PRELIMINARY EXPERIMENTS ON THE EFFECT ON ITS DEVELOPMENT OF INITIAL SWIRL DISTRIBUTION,
by W. G. Rose. June 62, 27p. 8 refs.
(Contract AF 49(638)248)
(AFOSR 2552) Unclassified report

DESCRIPTORS: *Jets, *Fluid flow, Measurement, Velocity, Intensity, Pressure, Reynolds number, Distribution theory, Turbulent flow.

A description is given of a device designed to generate a 'strongly' swirling turbulent jet with an initial swirl distribution which is roughly a vortex with a core in solid body rotation. Experimental results are reported of measurements taken at the discharge of the unit (the jet origin) and along the axis of the jet issuing from it. All measurements were taken on the jet axis and include mean-velocities, axial turbulence intensity components, and mean static-pressure distributions. Based on the results, the device, or 'swirl generator', performs successfully. Although no radial distributions were measured, the classification 'strong' swirl is justified in part by the magnitude of static-pressure differences generated between ambient conditions and those on the jet axis at its origin, and in part by the low values of Rossby number that are established. The experiments on the effect of initial swirl distribution demonstrate the need for a more extensive and systematic investigation to separate swirl effects from Reynolds number effects. It should be possible to establish the range of Reynolds numbers and swirl strengths required with the swirl generator as it is presently constructed. (Author)

AD-292 308 Div. 9, 22
(TISTE/CRJ) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
FREE-SURFACE WATER-TUNNEL TESTS OF AN UNCAMBERED BASE-VENTED PARABOLIC HYDROFOIL OF ASPECT RATIO ONE,
by Thomas G. Lang and Dorothy A. Daybell. Sep 62, 33p. incl. illus. tables, 9 refs. (Rept. no. NOTS TP 2942)
(NAVWEPS rept. no. 7920) Unclassified report

DESCRIPTORS: *Hydrofoils, *Hydrodynamics, *Torpedoes, Exhaust gases, Control surfaces, Propeller blades, Water tunnels, Test methods, Pressure, Drag, Lift, Moments.

Results of water-tunnel tests on the base-vented hydrofoil model show that the lift and moment coefficients and the lift coefficient derivative are all essentially independent of ventilation number and are approximately equal to coefficients of uncambered airfoils having the same

aspect ratio. The drag coefficient agreed only partially with two-dimensional cavity drag theory. The maximum lift-to-drag ratio was 6.5 when fully vented and 2.4 when fully wetted. Due to the reduced blockage of the Free Surface Water Tunnel at the California Institute of Technology, the minimum ventilation number (K) was 0.02 and the minimum air-flow rate coefficient (Q'cr providing full ventilation was 0.026 (rate increasing) and 0.013 (rate decreasing). (Author)

AD-292 333 Div. 9
(TISTP/JW) OTS price $7.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
INTERFEROMETER STUDY OF HEAT TRANSFER FROM A CASCADE OF HORIZONTAL CYLINDERS IN FREE CONVECTION.
Master's thesis,
by Richard W. Hilland. Aug 62, 61p. incl. illus. tables, 5 refs. (Rept. no. GA/ME/62-2)
Unclassified report

DESCRIPTORS: *Heat transfer, *Interferometers, Convection, Cylindrical bodies, Laminar boundary layer, Temperature, Heat exchangers, Theses.

Boundary layer and wake interaction among groups of heated horizontal cylinders were studied with the aid of the Zehnder-Mach Interferometer. Interaction between two cylinders was studied using cylinders of three different diameters. The average heat transfer rates were plotted as a function of the separation between cylinders, and local values around the circumference of each cylinder were plotted for the specific cylinder configurations studied. Cascades of five and seven cylinders were also studied. The results obtained from a study of two cylinders show that for constant power input, heat transfer rates decrease and cylinder wall temperatures increase as the separation between cylinders decreases. By comparing the heat transfer rate from the center cylinder in cascades of 5 and 7 cylinders with results from other studies, it was determined that a group of 4 cylinders surrounding a center cylinder has essentially the same influence on the center cylinder as many surrounding cylinders would have. (Author)

AD-292 335 Div. 9, 25
(TISTE/OHD) OTS price $8.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
EFFECT OF VIBRATION ON HEAT TRANSFER FROM CYLINDERS IN FREE CONVECTION.
Master's thesis,
by Robert M. Russ. Aug 62, 75p. incl. illus. tables, 9 refs. (Rept. no. GA/ME/62-4)
Unclassified report

DESCRIPTORS: *Heat transfer, *Vibration, Cylindrical bodies, Convection, Interferometers, Test equipment, Theses, Air force research, Heaters, Thermocouples, Boundary layer.

A number of investigations have been conducted with horizontal cylinders in free convection to determine the effect of vibration on the heat transfer rate. This study was a continuation using higher vibration intensities (product of amplitude and frequency). An attempt was made to correlate the changes in the heat transfer rate with that of forced convection. The investigation was conducted with three different size cylinders vibrated transversly in air. The diameters of the cylinders were 3/4, 1/4, and 0.085 inches. The investigation was conducted over a frequency range of 0 to 130 cps, and an amplitude range of 0 to 0.165 inches. The surface temperature of the cylinders was varied over a range of 125 to 167 F. Results showed that the effect of vibration on the heat transfer rate for a particular cylinder is a function only of the vibration intensity, and that the heat transfer rate is increased over 300% at high vibration intensities. From an interferometer study, the boundary layer is quite complex and goes through several transitions as the vibration intensity is increased. The boundary layer does appear similar to that of forced convection at vibration intensities in excess of 12 inches/second. (Author)

AD-292 336 Div. 9, 25, 30
(TISTE/OHD) OTS price $8.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
CHARACTERISTICS OF A RADIO-FREQUENCY A.C. ELECTRIC ARC.
Master's thesis,
by Alan John Shade. Aug 62, 75p. incl. illus. 6 refs. (Rept. no. GA/ME/62-5)
Unclassified report

DESCRIPTORS: *Electric arcs, *Electric discharges, *Radiofrequency, Plasma physics, Medium frequency, High speed photography, Air force research, Argon, Nitrogen, Electrodes, Test equipment, Theses, Experimental data, Stability.

The purpose of the study was to determine if a stable arc could be produced at radio-frequency and, if so, to determine the arc's static and dynamic operating characteristics (voltage vs. current) using various parameters. The arc was operated in argon and nitrogen, using a 400 kc., 200 kw. power plant designed for industrial induction heating. Two 3/4-inch diameter, water-cooled, copper electrodes were used, inside a quartz tube. The arc was vortex stabilized. The r-f voltage and current, the d-c input power, and the temperature and flow of the cooling water were measured. High-speed photography (7000 and 28,000 frames/sec.) was used to obtain pictures of the arc in operation. The flow rate of argon was varied from 0 to 350 standard cubic feet per hour. The gap between the electrodes was varied from 0 to 4-1/2 inches. The r-f voltage varied from 0 to 2000 volts while the current varied from 0 to 560 amperes. A very stable arc was produced. It was found that the characteristics varied very little with either gas flow or arc length. (Author)

AD-292 337 Div. 9, 25, 30
(TISTE/OHD) OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL STUDY OF A TRANSPIRATION-COOLED WALL STABILIZED D-C ARC.
Master's thesis,
by Peter D. Tannen. Aug 62, 82p. incl. illus. tables, 21 refs. (Rept. no. GA/ME/62-6)
Unclassified report

DESCRIPTORS: *Electric arcs, *Electric discharges, *Sweat cooling, Direct current, Argon, Heat transfer, Plasma physics, High-speed photography, High temperature research, Voltage, Electric currents, Graphite, Air force research, Instrumentation, Enthalpy, Experimental data, Theses.

A study was made of a D-C arc device which con-

fined the arc column within a 1/4-in.-diameter tube with transpiration-cooled walls. The tube was composed of individual porous segments which were electrically insulated from each other. The arc was struck between a tungsten cathode and a water-cooled, hollow copper anode. Argon was the principal gas used for the study. All the gas entered the discharge region as transpiration coolant. Wall lengths of one, two, and three inches were tested at various transpiration rates. The volt-ampere curves for this device had negative characteristics below 40 amperes and slope reversals in the range of 40-45 amperes. At the highest transpiration rates, device efficiencies on the order of 55%, and wall efficiencies of approximately 80%, could be maintained at the highest power levels. The heat transfer coefficients for transpiration and non-transpiration flows were compared at low power inputs and at the same total mass flows. The results indicate that the coefficient may be reduced to 5% of its original value by the application of transpiration flow. High-speed motion pictures at 7,000 frames-per-second were taken of the arc column. (Author)

AD-292 340 Div. 9
(TISTM/EJH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
USE OF VARIATIONAL METHODS IN PROBLEMS OF VIBRATION OF LIQUID AND LIQUID-FILLED BODIES.
17 Dec 62, 2p. 7 refs. (AID rept. no. 62-203; Trans. from Akademiya nauk SSSR. Vychislitel'nyy tsentr. Variatsionnyye metody v zadachakh o kolebanii zhidkosti i tela s zhidkost'yu (sbornik) Moskva, 1962, 245p.)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Hydrodynamics, Liquids, Vibration, *Aerodynamics, Aerodynamic configurations, Fuel tanks, Cylindrical bodies, Structural shells, Aircraft, Ships, Programming, Theory, Mathematical analysis, USSR.

This book, comprising seven articles, explains the use of variational methods in analyzing the dynamic behavior of liquid-filled bodies. Advantages of the methods are seen in their universality and in the fact that they make it possible to standardize the computation processes, i.e., to use standard programs in the computing technique. (Author)

AD-292 343 Div. 9
(TISTA/SEB) OTS price $9.10

Giannini Controls Corps., Durante, Calif.
PARAMETRIC ACCURACY STUDY OF A PREVIOUSLY PUBLISHED DECAY-DAMPING RELATIONSHIP,
by Albert G. Fonda. Dec 62, 35p. illus. tables, 5 refs. (Rept. no. ARD TR-02-003) (Contract AF 49(638)1015; Continuation of Bell Aerosystems Co., Buffalo, N. Y., Contract AF 49(638)749)
Unclassified report

DESCRIPTORS: *Elasticity, *Aerodynamics, Flutter, Damping, Mathematical analysis, Equations, Theory, Supersonics, Subsonic flow, Frequency, Airframes, Analysis, Wings, Aerodynamic configurations, Deflection, Ailerons.

A method has been previously published, with algebraic proof, for the approximation of the motion decay coefficients of aeroelastic systems from their conventionally computed required damping coefficients. Results found by this method, for many combinations of conditions, are compared with exact results found by otherwise less satisfactory methods. Recent refinements of the original technique are presented. The decay-damping relationship proves extremely accurate in most instances. Large errors prove to be strongly correlated with certain parameters of the solution, forming dependable error indicators within the method. The decay-damping transformation extends the conventional flutter solution technique into a full predictor of classical system response; the present report completes a series of reports introducing this method for general use. (Author)

AD-292 601 Div. 9
(TISTA/FRL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE LEADING-EDGE TEMPERATURE OF A FLAT PLATE SUBJECTED TO AERODYNAMIC HEATING,
by V. B. Poruchikov. 18 Oct 62, 7p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-1320 from Vestnik Moskovskogo Universiteta, No. 1, pp. 47-52, 1962)
Unclassified report

DESCRIPTORS: *Metal plates, Laminar boundary layer, Operational calculus, Compressible flow, Aerodynamic configurations, Temperature, USSR, Aerodynamic heating.

The report provides methods for the determination of the leading-edge temperature of a flat plate subjected to aerodynamic heating. (Author)

AD-292 654 Div. 9, 25
(TISTP/TL) OTS price $1.10

Foreign Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A MAGNETOGASDYNAMIC ASYNCHRONOUS GENERATOR,
by V. S. Yakovlev. 15 Nov 62, 2p. incl. illus. (Trans. no. FTD-TT-62-196 from Soviet Patent No. 141962 (693898/24) 19 Jan 1961)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Sheets, *Filament wound construction, *Insulating materials, *Magnetic fields, *Generators, Resistance, Conductivity.

The object of the invention is a magnetogasdynamic asynchronous generator in the form of a flat tube made of insulating material with a multiphase winding, which creates a magnetic field traveling in the direction of motion of the gas. The special feature of the proposed generator, which ensures a decrease in the electrical resistance of the secondary-current loop in the gas and an improvement in the operational characteristics, consists in the fact that the end sections of the tube are made of a conducting heat-resistant material, such as graphite or metal. (Author)

AD-292 658 Div. 9
(TISTA/FRL) OTS price $1.60

Foreign Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FLIGHT - EXPLOSION,
by L. Yur'yev. 2 Nov 62, 17p. incl illus. (Trans. no. FTD-TT-62-98 , from Nauka i Zhizn' (Science and Life) No. 5, pp. 17-22, 1961)
Unclassified report

Division 9 - FLUID MECHANICS

DESCRIPTORS: *Blunt bodies, Shock waves, Supersonics, Swept-back wings, Aerodynamic configurations, Re-entry aerodynamics, Spikes, Aerodynamics, USSR, Supersonic flow.

A study was made of a new method of study and calculation of the motion of slender, blunt-faced bodies through air and the propagation of explosive waves. (Author)

AD-292 664 Div. 9, 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LIMITS OF STABLE EXISTENCE OF POSITIVE GAS DISCHARGE COLUMN,
by I. A. Poletayev. 28 Nov 62, 13p. incl. illus. table (Trans. no. FTD-TT-62-1238 from Zhurnal Tekhnicheskoi Fiziki, 21:9, pp. 1021-1028, 1951)
Unclassified report

DESCRIPTORS: *Gas discharges, *Fluid flow, Plasma physics, Translations, Electron bombardment, Ionization, Combustion.

AD-292 674 Div. 9, 10, 27
(TISTA/SEB) OTS price $9.10

James Forrestal Research Center, Princeton U., N. J.
PROJECT SQUID. A COOPERATIVE PROGRAM OF FUNDAMENTAL RESEARCH AS RELATED TO JET PROPULSION.
Semi-annual progress rept., 1 Apr-30 Sep 62. 1 Oct 62, 102p. incl. illus. tables, refs.
(Contract Nonr-185825, Proj. NR 098-038)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Transport properties, *Kinetic theory, *Combustion, Plasma physics, Turbulence, Fluid flow, Chemical reactions, Solid rocket propellants, Magnetohydrodynamics, Plasma jets, Flames, Rocket motor nozzles, Rocket propulsion, Research program administration, Thermal conductivity, Exhaust flames, Theory.

Contents:
Nonsteady and nonequilibrium flow
Investigation of turbulence
Dynamics of gases and plasmas
Thermodynamic and transport properties of gases at high temperatures and pressures
Properties of two-phase flow
Thermal conductivity of gases and liquids
Fluid flow with suspended particles
Kinetics of elementary reactions
Reaction kinetics in high-temperature gases
High-temperature reactions
Chemical kinetics and gas dynamics of surface-catalyzed atom and free-radical reactions
Inelastic molecular collisions
Solid-propellant flame mechanisms
Thermal conductivities of gases at high temperatures
Magnetohydrodynamics of partially ionized gases
Fluctuations in plasma jets
Flame structure and burning characteristics of high energy fuels and oxidizers
Plasmaflow in nozzles

AD-292 901 Div. 9
(TISTA/LSK) OTS price $4.60

Centre National d'Etudes et de Recherches Aeronautiques, Brussels (Belgium).
LAMINAR SEPARATION IN SUPERSONIC FLOW.
Final rept., 1 Dec 61-30 Sep 62, by Jean J. Ginoux. 30 Sep 62, 45p. incl. illus. tables, 5 refs.
(Grant AF EARO 62-52)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, Heat transfer, Supersonic flow, Metal plates, Model tests, Wind tunnel models, Theory, Attachment, Drag, Turbulent flow, Separation.

A preliminary experimental investigation was made of the effect of three-dimensional flow perturbations on the heat-transfer rate in the reattachment region of a laminar flow behind a two-dimensional backward-facing step. It was found that the mean value of the heat-transfer rate was increased by as much as 70% by the presence of strong flow perturbations, while the recovery factor increased approximately from the laminar value to the turbulent one. A novel technique of heat-transfer measurements was used, by which heat was uniformly dissipated on the surface of the model. A theory was developed for the case of a supersonic flow over a flat plate, which gives an exact solution of the boundary-layer equations when heat is uniformly dissipated on the surface. It was shown in particular that the ratio of the heat-transfer coefficient for an isothermal wall to the heat-transfer coefficient for uniform heat-flux is a constant independent of Mach number and Reynolds number. Numerical integration showed that it is equal to 0.72, independently of the Prandtl number in the range 0.5 to 1.0. (Author)

AD-292 906 Div. 9
(TISTP/JW) OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
STATISTICAL THERMODYNAMICS.
Final rept.,
by Laszlo Tisza. 30 Sep 62, 6p. 9 refs.
(Contract AF 49(638)95)
Unclassified report

DESCRIPTORS: *Thermodynamics, *Statistical processes, Equilibrators, Distribution, Functions, Theory.

AD-292 937 Div. 9, 25
(TISTP/JW) OTS price $2.60

Yeshiva U., New York.
STATISTICAL THERMODYNAMICS OF NONUNIFORM FLUIDS,
by J. L. Lebowitz and J. K. Percus. 1962, 20p. 9 refs.
(Contract AF 49(638)753; In cooperation with Institute of Mathematical Sciences, New York U. N. Y.)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Thermodynamics, Equilibrators, Distribution, Functions, Statistical analysis, Density, Taylor's series, Fluid flow.

A general formalism is developed for obtaining the low order distribution functions n sub q (r sub 1,...,r sub q) and the thermodynamic parameters of nonuniform equilibrium systems where the nonuniformity is caused by a potential U(r). The method consists of transforming from an initial (uniform) density n sub o to the final desired density n(r) via a functional Taylor expansion. When n sub o is chosen to be the density in the neighborhood of the r's we obtain n sub q as an expansion in the gradients of the density. The expansion parameter is es-

sentially the ratio of the microscopic correlation length to the scale of the inhomogeneities. The analysis is most conveniently done in the grand ensemble formalism where the corresponding thermodynamic potential serves as the generating functional (with the U(r) as the variable) for the n sub q. The transition from U(r) to n(r) as the relevant variable is accomplished via the direct correlation function which enters very naturally relating the change in U at r sub 2 due to a change in n at r sub 1. It is thus essentially the matrix inverse of the two-particle Ursell function. The analysis is applied to obtain the asymptotic behavior of the radial distribution function in a uniform system. (Author)

AD-292 958 Div. 9, 25
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ON AN UNSYMMETRIC HYPERSONIC FLOW ABOUT A CIRCULAR CONE,
by B. M. Bulakh. 2 Jan 63, 8p. 7 refs. (AID rept. T-63-1; Trans. from O Nesimmetrichnom Giperzvukovom Obtekanii Krugovogo Konusa. Prikladnaya Matematiki I Mekhaniki, 26:5, pp. 973-976, 1962)
Unclassified report

DESCRIPTORS: *Hypersonic flow, *Conical bodies, Angle of attack indicators, Viscosity, Gases, Vector analysis, Particles, Velocity, Fluid flow, Translations.

A nonviscous hypersonic flow about a circular cone at an angle of attack alpha was considered by A. L. Gonor, who sought a solution in the form of power series in epsilon = (gamma-1)/(gamma + 1) (where gamma is the adiabatic index) and obtained the first terms of the expansions in parametrically closed form. In the present work, a vortex layer, in which the solution cannot be approximated by a partial sum of a series in powers of epsilon, is shown to exist near the cone surface, by reason of which it is not possible to determine the velocity components at the cone surface using A. L. Gonor's theory. A method, taking Gonor's solution as a point of departure, for obtaining the velocity components at the cone surface with an accuracy O (epsilon) inclusively, is demonstrated. (Author)

AD-292 965 Div. 9, 31
(TISTE/OHD) OTS price $5.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
HYDROFOIL MOTIONS IN IRREGULAR SEAS,
by Richard P. Bernicker. Nov 62, 52p. incl. illus. 13 refs. (Rept. no. 909)
(Contract Nonr-26342, Proj. NR 062-273)
Unclassified report

DESCRIPTORS: *Hydrofoil boats, *Hydrofoils, *Water waves, *Ocean waves, Harmonic analysis, Statistical distributions, Statistical functions, Hydrodynamics, Ship models, Analysis.

An experiment designed to investigate the validity of linear superposition principles as applied to the irregular motions of non-ventilated, dihedral hydrofoil systems in random seas was performed. Tests were first carried out on a typical tandem V foil system in various regular waves in both head and following seas to determine the response operator spectrum for the heaving and pitching motions. Irregular sea experiments with the same model were analyzed using spectral analysis techniques to obtain the wave spectrum and longitudinal motions spectra. Comparison between these spectra and those predicted using the regular sea response data and irregular wave spectrum indicated good agreement, with maximum deviation of about 20% in the range of significant wave energies. From this experiment, the linear superposition technique for predicting motions in random seas is seen to be valid to at least the same degree as for displacement vessels. (Author)

AD-292 967 Div. 9
(TISTP/JW) OTS price $4.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
EXPERIMENTAL DETERMINATION OF SURFACE-PIERCING, FULLY VENTILATED HYDROFOIL STABILITY DERIVATIVES BY A FREE OSCILLATION TECHNIQUE,
by Gerard Fridsma and P. Ward Brown. Nov 62, 39p. incl. illus. table, 6 refs. (Rept. no. 897)
(Contract Nonr-26320, Proj. NR 062-212)
Unclassified report

DESCRIPTORS: *Hydrofoils, Motion, Oscillation, Frequency, Damping, Surfaces.

The results of an experimental evaluation of the dynamic stability derivatives of surface-piercing, fully ventilated, dihedral hydrofoils are presented, including the effects of variation in speed, trim, immersion, mass, moment of inertia and frequency of oscillation. The tests were made by the uncoupled free oscillation technique with either freedom in heave or pitch. An analysis of the results is presented on the basis of quasi-steady theory, including the derivation of a new expression for the pitch damping derivative, and is shown to be in good agreement with theoretical predictions. It is concluded that the quasi-steady theory will be adequate for all prototype designs of surface-piercing fully ventilated hydrofoils. (Author)

AD-292 977 Div. 9, 15
(TISTP/WH) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
COMPOSITION FORMULAS IN GENERALIZED AXIALLY SYMMETRIC POTENTIAL THEORY,
by R. P. Gilbert. Oct 62, 20p. 16 refs. (Technical note no. BN-298)
(Grant no. AFOSR 62-454)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Partial differential equations, *Axially symmetric flow.

A composition or quasi-multiplication is introduced for solutions of the generalized axially symmetric potential theory equation (GASPT), so that the composition of two solutions is always a solution. Analogues to the Cauchy integral formulas are developed and stated in terms of composition formulas. In addition the composition algebra is investigated for certain classes of functions. (Author)

AD-293 163 Div. 9, 25, 15
(TISTP/WH) OTS price $3.60

Paris U. (France).
STRONG INTERACTION SYMMETRIES AND RELATIONS BETWEEN POLARIZATIONS FOR pp-YY,
by Eduardo de Rafael. 15 Jan 62, 32p. incl. illus. tables, 9 refs. (Technical note no. 3)
(Contract AF 61(052)474)
(AFOSR-2326) Unclassified report

DESCRIPTORS: *Quantum mechanics, *Particles, *Hyperons, *Polarization, *Mesons, Operators (Mathematics), Matrix algebra, Complex numbers, Meson cross sections, Scattering.

The consequences of different symmetry groups for strong interactions are studied in terms of reactions between polarizations. Some experimental tests concerning antihyperon - hyperon production by means of pp and pd annihilations are proposed. (Author)

AD-293 273 Div. 9, 25
(TISTM/EJH) OTS price $3.00

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
A BIBLIOGRAPHY OF RUSSIAN LITERATURE IN THE FIELD OF MAGNETOHYDRODYNAMICS,
by Frances Brown and Rosa Bernstein. Apr 62, 143p. (TIS rept. no. R62SD90)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Plasma physics, *Bibliography, Shock waves, Gas ionization, Superaerodynamics, USSR, Abstracting.

This bibliography covers Russian literature in the field of magnetohydrodynamics from 1958 to 1962. A few references, somewhat less recent, were included because of their importance. Some of the main sources searched included: (1) International Aerospace Abstracts; (2) Monthly Index to Russian Accessions; (3) Engineering Index; (4) Technical Translations; (5) NASA Announcements; and (6) Monthly Catalogue of U.S. Gvernment Publications. References are arranged alphabetically by author, and each author's work is listed chronologically by date or original publication. Both the original and translated citations have been included when possible. Abstracts were included when available. (Author)

AD-293 435 Div. 9, 25
(TISTP/JW) OTS price $4.60

RAND Corp., Santa Monica, Calif.
ON THE FOUNDATIONS OF RELATIVISTIC CONTINUUM MECHANICS,
by Dominic G. B. Edelen. Dec 62, 38p. (Memo. RM-3392-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Continuum mechanics, *Relativity theory, Tensor analysis, Energy, Equations, Deterioration, Motion, Fluid flow, Kinetic theory.

The Einstein theory of general relativity is shown to yield a general mechanics of continuous media under appropriate restrictions of the momentum-energy tensor. Physical interpretations of the governing equations are derived, and constitutive relations are developed for general and isotropic materials. It turns out that under rather general circumstances, the relativistic continuum may be interpreted as a space filled by a flow of rest energy. Invariant requirements for the existence of a stress potential are obtained, the satisfaction of which leads to a decomposition and partial evaluation of the rest energy. (Author)

AD-293 448 Div. 9, 30
(TISTA/SEB) OTS price $5.60

General Dynamics/Astronautics, San Diego, Calif.
INVISCID AND VISCOUS HYPERSONIC NOZZLE FLOW WITH FINITE RATE CHEMICAL REACTIONS,
by E. S. Levinsky and J. J. Brainerd. Jan 63, 43p. incl. illus. tables, 19 refs.
(Contract AF 40(600)925, Proj. 8952)
(AEDC TDR 63-18) Unclassified report

DESCRIPTORS: *Hypersonic nozzles, Chemical reactions, Hypersonics, Laminar boundary layer, Enthalpy, Catalysis, Mathematical analysis, Equations, Theory, Boundary layer, Viscosity, Gas flow, Wind tunnel nozzles, Hypersonic wind tunnels, Shock tubes.

Procedures are developed for determining the inviscid core and boundary layer development in diverging nozzles with high enthalpy reservoir conditions in which the gas composition has been displaced from equilibrium by chemical relaxation. A finite difference procedure, based on the method of characteristics, is used for the inviscid flow with finite rate chemical reactions. Laminar boundary layer profiles, based on local similarity, are obtained by integrating the coupled boundary layer and chemical reaction equations outward from the nozzle wall. Free stream boundary conditions on the chemical specie concentrations and the thermodynamic variables are satisfied by iterating on the unknown concentrations and derivatives at the wall. Numerical calculations are presented for the AEDC, VKF low density tunnel and the Convair hypersonic shock tunnel. Effects of chemical reactions in the boundary layer are restricted to the region in which the core flow has not yet frozen and in which the boundary layer is thin. When the boundary layer is thick enough to influence the core expansion, gas phase reactions are frozen. (Author)

AD-293 651 Div. 9
(TISTA/GEC) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STAGNATION POINT OF A BLUNT BODY IN HYPERSONIC FLOW,
by T. Y. Li and R. E. Geiger. 1956, 19p. illus. 8 refs.
(Contract AF 04(645)24)
Unclassified report

DESCRIPTORS: *Blunt bodies, Aerodynamics, Boundary layer, Hypersonics, Theory, Axially symmetric flow, Mathematical analysis, Shock waves, Pressure, Spheres, Hypersonic flow.

A method of calculation is presented which yields all the important information on the inviscid hypersonic flow in the stagnation point region of a blunt body in hypersonic flow. It is demonstrated that Hayes' results (Hypersonic Flow Fields at Small Density Ratio, RAMO, Wooldridge Corporation, May 1955) are valid in the stagnation point region and can indeed be considered as a basis for constructing less restricted solutions. Equations are presented giving velocity, pressure, detachment distance, and vorticity. The valves of shock detachment distance and body pressure coefficient are compared with experimental data for spheres. The pressure comparison shows that the results of Hayes and the present theory represent a better approximation than the Newtonian impact theory for hypersonic Mach numbers. (Author)

10. FUELS AND COMBUSTION

AD-292 190 Div. 10
(TISTP/JW) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMBUSTION AT LOWERED PRESSURES AND SOME PROBLEMS IN THE STABILIZATION OF A FLAME IN SINGLE-PHASE AND DOUBLE-PHASE SYSTEMS (SELECTED ARTICLES).
7 Nov 62, 46p. incl. illus. tables, refs. (Trans no. FTD-TT-62-948 from Goreniye Pri Ponizhennykh Davleniyakh i Nekotoryye Voprosy Stabilizatsii Plameni v Odnofaznykh i Dvukhfaznykh Sistemakh, Moskva, An SSSR, pp. 24-42, 71-85, 1960)
Unclassified report

DESCRIPTORS: *Combustion, *Pressure, Translations, Flames, Stabilization, Vaporization, Laminar boundary layer.

Contents:
The influence of reduced pressure on flame propagation and the combustion zone in turbulent flow
The effect of pre-vaporization on the completeness and stability of combustion of atomized fuel

AD-292 214 Div. 10
(TISTM/TCG) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE INFLUENCE OF CHEMICAL COMPOSITION AND ADMIXTURES ON THE COMBUSTION OF FUEL IN JET ENGINES,
by Ya. M. Paushkin, R. V. Sychev and others.
24 Oct 62, 26p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-62-743 from Sbornik Trudov, Mezhvuzovskiye Soveshchaniya Po Khimii Nefti, pp. 293-314, 1960)
Unclassified report

DESCRIPTORS: *Jet engines, *Fuels, *Hydrocarbons, Mixtures, Combustion, Ignition, Chemicals, Liquids, Benzenes, Cyclohexanes, Naphthalenes, Heptanes, Temperature, Propyl radicals, Methyl radicals, Kerosene, Diesel engines, Oils, Air cooled.

The role of chemical composition of fuel in air-breathing and liquid-fuel jet engines is discussed relative to combustion and self ignition temperatures of hydrocarbon fuels. (Author)

AD-292 238 Div. 10
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE BURNING VELOCITY OF ATOMIZED FUEL,
by V. Ya. Basevich. 17 Oct 62, 13p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-62-1028 from Sgoraniye i Smeseobrazovaniye v Dizelyakh, Trudy Nauchno-Tekhnicheskoy Konferentsii, provedennoy v iyune 1958g. Laboratoriyey dvigateley. Izdatel'stvo Akademii Nauk SSSR, Moscow, pp. 10-18, 1960)
Unclassified report

DESCRIPTORS: *Fuels, *Atomization, *Combustion, Velocity, Liquids, Drops, Vaporization, Mixtures, Flame propagation, Particle trajectories, Theory, USSR.

On the basis of a number of assumptions, an attempt has been made to evaluate the values of the burning-velocity constant complicated conditions particularly for the burning of an ensemble of drops of different dimensions in a high velocity turbulent flow. (Author)

AD-293 403 Div. 10
(TISTM/EJH) OTS price $11.00

Aerospace Corp., Los Angeles, Calif.
PROPELLANT PERFORMANCE AND GAS COMPOSITION HANDBOOK,
by S. A. Johnston, E. A. Cook and others.
10 Oct 62, 1v. incl. tables (Suppl. 1 to Rept. no. TDR 930(2210-07)TN-1, AD-273 675)
(Contracts AF 04(647)930, AF 04(695)169 and AF 04(695)69)
(DCAS TDR 62-2, suppl. 1)
Unclassified report

DESCRIPTORS: *Handbooks, *Tables, *Liquid rocket propellants, *Rocket oxidizers, *Gaseous rocket propellants, Mathematical analysis, Rocket motors, Liquefied gases, Oxygen, Hydrogen, Nitrogen compounds, Tetroxides, Hydrazines, Fluorine, Perchloryl radicals, Chlorine compounds, Methyl hydrazine, Fluorides, Amines, Pentaboranes, Nitric acid, Methanes, Nitro radicals, Peroxides, Hydrogen compounds, Specific impulse.

Performance tables are presented which were obtained by plotting data from machine calculations and interpolating to obtain vacuum specific impulses for integral values of the area ratio. The values are convenient reference points for the calculation of interpolated values of the specific impulse for any given area ratio. Tables of gas compositions and performances are also included. (Author)

AD-293 681 Div. 10
(TISTM/ODN) OTS price $4.60

RAND Corp., Santa Monica, Calif.
A COMPILATION OF PHYSICAL AND CHEMICAL DATA PERTAINING TO SELF-IGNITING FUELS FOR RAMJET PROPULSION,
by Yvonne M. Claeys. 15 Aug 49, 42p. incl. tables, refs. (Rept. no. RM-273)
Unclassified report

DESCRIPTORS: *Fuels, *Ramjet propulsion, *Fuel additives, Organic compounds, Inorganic substances, Physical properties, Chemical properties, Data, Tables, Ignition, Boron compounds, Hydrides, Metalorganic compounds, Phosphorus compounds, Silicon compounds, Thermodynamics.

This compilation comprises 147 chemical compounds which, because of their low activation energies, relatively high heats of combustion and flame stabilities, may be particularly useful in ramjet engines either as fuels or as fuel additives whose purpose is to promote continuous combustion without forced ignition. The compounds are divided into seven arbitrary groups as follows: boron compounds, inorganic compounds, miscellaneous hydrides, organo-metallic compounds, phosphorus compounds, and silicon compounds. Besides the usual physical and thermodynamic properties there are listed, wherever possible, such properties as activation energy, ignition temperature, ignition lag, reactivity in air, and reactivity in hydrocarbons. Observed data for these compounds are far from complete and no specific recommendations are made. Acceptance of any particular substance is subject to exhaustive tests which simulate actual ramjet service conditions. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-292 320 Div. 11
(TISTE/CRJ) OTS price $4.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF ROLLING LIQUID TRANSPORTER, 1,000-GALLON.
15 Sep 61, 42p. incl. illus. tables (Proj. ATB 2-11)
Unclassified report

DESCRIPTORS: *Cargo vehicles, *Liquids, Arctic regions, Tests, Reliability, Mobile, Transportation.

Tests were conducted to determine the suitability of the rolling liquid transporter, 1,000-gallon for Army use under arctic conditions. The rolling liquid transporter, 1,000-gallon, M1 (formerly T-3), consists of a pair of removable rubber containers mounted on an axle and towing assembly. The containers resemble overgrown, low-pressure tires in both appearance and operation. They measure 64 inches in diameter and 42 inches in width and have an 18-inch bead. Each of the two containers has a cargo carrying capacity of 500 gallons of liquid. Weight of the test transporter when empty is approximately 2,080 pounds and when filled with gasoline, approximately 8,000 pounds. The tests indicated that the transporter, when modified, will be suitable for Army use under arctic conditions. (Author)

AD-292 996 Div. 11, 30
(TISTE/OHD) OTS price $1.60

Marine Corps Development Center, Quantico, Va.
TRUCK, FORKLIFT, ROUGH TERRAIN, 6000 LB, MOBILITY AND TECHNIQUE OF EMPLOYMENT TEST.
Interim rept. no. 1.
19 Dec 62, 4p. illus. (Proj. 70-62-08)
Unclassified report

DESCRIPTORS: *Feasibility studies, *Tires, *Fork-lift vehicles, Test methods, Velocity, Terrain, Reliability, Swamps, Marine Corps.

The purpose of this evaluation was to investigate the mobility characteristics of the forklifts when equipped with duplex type tires and to accumulate experience and data in operational techniques and equipment use. Two trucks were tested to determine if an increase in mobility could be attained by using 23x23.5 in lieu of the standard 14.00x24 tires. The two trucks used in this evaluation were standard 6000 pound capacity rough terrain forklifts (RKF-060). (Author)

12. GUIDED MISSILES

AD-292 194 Div. 12
(TISTA/FRL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A NEW SERIES OF INVESTIGATIONS,
by V. Krasovskiy. 7 Nov 62, 4p. (Trans. no. FTD-TT-62-1579 from Izvestiya, no. 66, 1p. 18 Mar 62)
Unclassified report

DESCRIPTORS: *Satellite vehicles, Solar flares, Van Allen radiation belt, Terrestrial magnetism, USSR, Scientific research.

Investigations of the immediate vicinity of the earth, carried out with the aid of artificial earth satellites launched in the Soviet Union and in America are discussed. The value of collecting information on the space surrounding us, especially the radiation belts, is also reported. (Author)

AD-292 198 Div. 12, 2
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SATELLITES, ATMOSPHERE, AND ELECTRONS,
by Yu. Gal'perin and T. Mulyarchik. 29 Oct 62, 8p. (Trans. no. FTD-TT-62-1547 from Pravda (p. 6, cols. 1-3) 26 Sep 62)
Unclassified report

DESCRIPTORS: *Satellite vehicles, Electrons, Atmosphere, USSR, Space capsules, Aurorae, Scientific research.

Scientific investigations which are being carried on with this series-Cosmos III and Cosmos V, are reported. (Author)

AD-292 245 Div. 12
(TISTA/SEB) OTS price $3.60

Aeronutronic, Newport Beach, Calif.
CONTINUING SERVICES TO THE 496L SPO SYSTEM ANALYSIS AND INTEGRATION, PROGRAMMING, ORBIT DETERMINATION AND MAINTENANCE.
Final rept.
30 Nov 62, 27p. (Publication no. U-1927)
(Contract AF 19(604)7375)
(ESD TDR 62-341) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Orbital flight paths, Perturbation theory, Velocity, Motion, Errors, Drag, Least squares method, Mathematical analysis, Radar stations, Data processing systems, Satellite vehicle trajectories, Research program administration, Ground support equipment, Tracking, Determination.

Contents: Development of new/improved methods of orbit determination (Equatorial orbit computation, Initial orbit determination from angle observations only, Interplanetary program, General perturbations, Thrust applications, Determination of artificial energy changes in the orbit, Circumlunar (Unified Encke) trajectory program); Areas of research and analysis (Correlation of unassociated observations, Re-entry orbits of satellites); Modification of the A-1 system; Simulation error analysis; Tasks not specified in work statement (A-1 system documentation, Baker-Nunn camera acquisition coordinate program, Observing schedule program, Correlation of observations in RASSN, Orbital error analysis, Modification of drag and bulge perturbation calculations, Modification to the initial orbit program, Initial orbit radar fix program, Initial orbit least-squares fit program, Evaluation of general perturbations terms).

AD-292 620 Div. 12
(TISTA/FRL) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FIRST IN THE WORLD GROUP FLIGHT IN COSMIC SPACE

(BASIC RESULTS).
29 Nov 62, 39p. incl. illus. (Trans. no. FTD-TT-62-1578 from Pravda, No. 295 (16151) pp. 1-3, 22 Oct 62)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Space capsules, Spaceships, Satellite vehicle research, Television communication systems, Radio communication systems, Aviation safety, Space flight, Space medicine, USSR, Manned.

Data was obtained from the first flight in cosmic space on man's ability to endure conditions of cosmic flight, on conditions of orbiting and return to the surface of the Earth, on the performance of ship construction, and on the performance of the entire group of board and ground systems and devices. (Author)

AD-292 628 Div. 12
(TISTA/GEC) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
CONSIDERATION OF LUNAR OBLATENESS ON THE NUMERICAL INTEGRATION OF CIRCUMLUNAR TRAJECTORIES,
by Phyllis Turner. 12 Nov 62, 12p. incl. illus. 3 refs. (Rept. no. TDR-169(3550-40)TN-1)
(Contract AF 04(695)169)
(SSD TDR 62-186) Unclassified report

DESCRIPTORS: *Lunar probes, Moon, Geometry, Numerical analysis, Gravity, Errors, Mathematical prediction, Landing, Guided missile trajectories.

The effect of a non-symmetric lunar gravitational potential when included in the numerical integration of tight circumlunar trajectories is examined. The label of tight trajectories is applied here because in the lunar phase the vehicle is turned through the greatest possible angle, which is accomplished by very near approaches to the moon. Such trajectories would be affected the greatest by a non-symmetric lunar gravitation potential. The particular trajectories described have distances of closest approach to the moon's surface varying from 100 to 15,000 nautical miles and all impact the earth upon return, the return to earth being retrograde to the earth's rotation. The maximum deviation, due to inclusion of a lunar oblateness term, on return conditions at earth was in the order of 15 miles from a nominal impact position and 0.1 ft/sec in impact velocity, which is beyond the accuracy of n-body programs in use today. Thus it was determined that, for the numerical integration of circumlunar trajectories, the moon may be considered a sphere of uniform density. (Author)

AD-292 676 Div. 12, 15, 19
(TISTW/PCR) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
ANALYSIS OF NONCATASTROPHIC FAILURES IN DIGITAL GUIDANCE SYSTEMS,
by A. Holick. 1 Nov 62, 25p. incl. tables, 3 refs. (Rept. no. SRS-580)
(Contract AF 04(695)210)
Unclassified report

DESCRIPTORS: *Inertial guidance, *Guided missile computers, Failure (Mechanics), Velocity, Thrust, Guided missiles, Statistical analysis, Equations, Differential equations, Digital computers, Errors.

A method is presented for weighting noncatastrophic failures in digital guidance systems in accordance with their effect on system accuracy. The method is discussed for one particular class of malfunctions -- the transient -- and the velocity and thrust termination errors of an inertially guided rocket are derived from several statistical models for transient failures assuming Poisson arrival and random duration of the failures. The accuracy degradation caused by transient failures in the information path of a guidance computer during boost appears to be considerable and, certainly, not negligible compared with instrument anomalies. (Author)

AD-292 729 Div. 12
(TISTA/GEC) OTS price $1.10

Massachusetts Inst. of Tech., Cambridge.
(No title).
Summary rept.
27 Nov 62, 3p. 8 refs.
(Contract AF 49(638)363)
Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Satellite rendezvous vehicles, Effectiveness, Gravity, Control systems, Lunar probes, Landing, Research program administration, Exhaust gases, Rocket propulsion.

Investigations were made of: impulsive trajectory changes and their optimization, propulsion system parameter optimization, gravitational effects, and trajectory optimization and optimal control. (Author)

AD-292 940 Div. 12, 5
(TISTA/FRL) OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
ORBITAL ASPECTS OF NON-SYNCHRONOUS COMMUNICATION SATELLITE SYSTEMS,
by H. K. Karrenberg and R. D. Luders.
24 Sep 62, 56p. incl. illus. tables, 6 refs.
(Rept. no. TDR-169(3550-01)TN-1)
(Contract AF 04(695)169)
(SSD TDR 62-193) Unclassified report

DESCRIPTORS: *Satellite vehicles, Orbital flight paths, Ground support equipment, Radio relay stations, Analytic geometry, Theory, Communication systems.

Studies were made to determine the ability of pairs of ground terminals to communicate by means of mutually visible satellites in non-synchronous orbital systems. The dependence of communicability upon system parameters such as the number and inclination of the several orbit planes used, the total number of satellites in the system and their apportionment among the orbit planes, and their mode of distribution (random or evenly spaced) within the planes was examined. Several attractive 5000-nautical mile altitude systems were found and compared. An investigation was made of the improvement in communicability effected by the use of intermediate ground relay stations between pairs of widely separated or adversely oriented ground terminals. Studies were also made of the probable durations of interrupted and unavailable service and the relative distribution of communication 'holes.' (Author)

AD-292 948 Div. 12, 13
(TISTW/DLW) OTS price $2.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
A STUDY ON REDUCING OR ELIMINATING AIR CONDITIONING OF THE PERSHING GUIDANCE AND CONTROL

COMPARTMENT,
by Peter A. VanHoff and Russell T. Gambill.
1 Nov 62, 32p. incl. illus. table, 3 refs.
(Rept. no. RG-TM-62-27)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface to surface), *Air conditioning equipment, *Inertial guidance, *Guided missiles (Tactical), Climatic factors, Test methods, Feasibility studies, Temperature, Control systems, Costs, Mobile, Reduction, Reliability, Ground support equipment.

A study is presented on the possibility of removing or reducing the air conditioning now required by the PERSHING guidance and control compartment. A climatical study was made to establish the operational environment, and a proposed laboratory test program is described to determine guidance and control compartment operating temperature, specific tests to be performed on a missile, and the missile modifications and test equipment required. Also included are manpower and cost estimates for the proposed test program. (Author)

AD-292 995 Div. 12
(TISTA/GEC) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
OPTIMUM SATELLITE DISPENSING VELOCITIES FOR AN EQUATORIAL HIGH ALTITUDE NONSYNCHRONIZED SATELLITE COMMUNICATION SYSTEM,
by W. E. Morrow, Jr. 5 Dec 62, 5p. illus.
(Rept. no. 36G-3)
(Contract AF 19(628)500)
(AFESD TDR 62-255) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Satellite vehicle trajectories, High altitude, Launching, Effectiveness, Distribution, Velocity.

Studies were made of the advantages of a communication system employing many active satellites in high altitude (15,000 to 30,000 miles) unsynchronized equatorial orbits over 24-hour synchronous and unsynchronized medium altitude orbits. The high altitudes provide: much better ground coverage than medium altitudes, low ground antenna tracking rates, long satellite visibility periods thus avoiding the rapid ground antenna switching required with a medium altitude system, and the possibility of launching many of these simple long life satellites with a single booster instead of a single very complicated synchronized satellite. (Author)

AD-293 152 Div. 12
(TISTA/SEB) OTS price $1.60

California U., Los Angeles.
THE PROBLEM OF OPTIMAL MODE SWITCHING,
by R. A. Nesbit. 10 Sep 62, 19p. incl. illus. 20 refs.
(Grant AF-AFOSR 62-68; In cooperation with Aerospace Corp., El Segundo, Calif.)
Unclassified report

DESCRIPTORS: *Control systems, *Spaceships, *Switching circuits, Mathematical analysis, Satellite vehicle trajectories, Re-entry vehicles, Velocity, Dynamics, Equations, Spaceflight, Maneuverability.

A steepest descent modification of the switching times in a mode switching control system can be based on first variation computations, and the computer storage requirement less than that required for functional descent. By introducing control variables the mode switching system can be put in the format usually used in the study of control optimization. The application of the maximum principle yields a necessary condition for optimum switching and a necessary condition for chattering. If the switching problem is relaxed to assure the existence of an optimal solution the computational problem of finding this optimum is not simplified by the switching approach although mechanization of the control system may be simplified. The use of steepest descent procedure for determining the suboptimal control, using a fixed number of switches, is only based upon differential arguments. Some knowledge of the global properties of the trajectory is required to assure the usefulness of the procedure. (Author)

AD-293 495 Div. 12, 21
(TISTA/SEB) OTS price $4.60

Aerojet General Nucleonics, San Ramon, Calif.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS, SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION, CINCINNATI, OHIO, OCTOBER 2, 3, 4, 1962.
1962, 42p. incl. illus. 19 refs.
Unclassified report

DESCRIPTORS: *Nuclear propulsion, *Symposia, *Electric propulsion, Helium, Deuterium, Plasma physics, Energy, Magnetic fields, Magnetohydrodynamics, Space flight, Propulsion, Nuclear reactions.

Controlled fusion reactions applicable for aerospace applications are reviewed. Use of helium and deuterium reactions in magnetic fields are related.

AD-293 608 Div. 12
(TISTA/FRL) OTS price $3.60

David Taylor Model Basin, Washington, D. C.
PRESSURE DRAG REDUCTION AS A RESULT OF OPTIMIZING AN AFTERBODY SHAPE,
by Roger J. Furey. Apr 62, 29p. incl. illus. tables, 6 refs. (AERO rept. no. 1025)
Unclassified report

DESCRIPTORS: *Conical bodies, *Blunt bodies, Aerodynamic configurations, Pressure, Hemispherical shells, Bodies of revolution, Supersonics, Hypersonic nozzles, Wind tunnel models, Boundary layer, Data, Integral equations, Calibration, Effectiveness, Pitot tubes, Load distribution, Drag.

The pressure distribution, normal and axial force coefficients, and center-of-pressure locations of a minimum-drag model and a cone-cylinder calibration model of the same length, base diameter, and nose radius were determined. The tests were conducted at Mach numbers of 2.16 and 2.87, with corresponding Reynolds numbers of 0.78 x 10 to the 6th power and 0.55 x 10 to the 6th power, respectively, using the base diameter as reference length. The results show the minimum-drag model to have approximately 40% less pressure drag under all conditions tested. Center-of-pressure variation with increasing Mach number was also found to be more stable for the minimum-drag model. (Author)

AD-293 627 Div. 12
(TISTA/GEC) OTS price $13.00

Little, Arthur D., Inc., Cambridge, Mass.
CONTROL AND INSTRUMENTATION DATA FOR THE TITAN I

PROPELLANT-LOADING SYSTEM.
Revision A on WS 107A-2 Program,
22 Sep 61, 1v. incl. illus. tables.
(Contract AF 04(647)464)
Unclassified report

DESCRIPTORS: *Guided missiles (Strategic), *Liquid rocket propellants, *Launching, Instrumentation, Nitrogen, Helium, Control systems, Ground support equipment, Rocket propulsion, Liquefied gases, Oxygen, Handling, Operation, Automatic, Fuel systems, Loading, Preparation.

The Titan I Propellant loading System (PLS) consists of three subsystems - one each for servicing N, liquid O, and He. It has been designed to be operated automatically from remote stations. The loading and holding operations are normally completely automatic and are initiated from the control center. They can be interrupted and the system shut down during the countdown, either by operating personnel (at any time) or, after the Raise Launcher command, automatically on receipt of a no-go or hazard signal. The unloading operation is semiautomatic and is controlled from the equipment terminal. Block diagrams of the PLS control system are presented. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-292 183 Div. 13, 27
(TISTE/OHD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HYDRAULIC VOLUMETRIC PUMP,
by L. A. Yutkin and L. I. Gol'tsova. 30 Oct 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1296 from Patent no. 124805, Appl. no. 110887/59c, 1:pp. 1-2, 7 Mar 59)
Unclassified report

DESCRIPTORS: *Hydraulic pressure pump, Shocks, Translations, USSR, Patents, Electrodes.

The hydraulic volumetric pump, according to author's certificate, is distinguished by the fact, that, for the purpose of insuring the necessary synchronization of closing the pressure valve after an electro-hydraulic shock inside the chamber of the pump, the rear of the valve is rigidly connected to the stock of the piston, filled with a liquid of the additional chamber, provided for creating an electro-hydraulic shock in it with electrodes, connected to the combustion circuit, the delay of which is regulated by ordinary means. (Author)

AD-292 332 Div. 13, 25
(TISTE/OHD) OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
THE DIRECT-CONTACT HEAT EXCHANGER.
Master's thesis,
by Carter M. Glass. Aug 62, 84p. incl. illus. tables, 7 refs. (Rept. no. GA/ME/62-1)
Unclassified report

DESCRIPTORS: *Heat exchangers, *Boilers, Water, Coolants, Theory, Theses, Air force research, Experimental data.

The purpose of this study was to design, construct, and examine the performance of a heat exchanger in which one fluid boiled another by direct-contact heat transfer. Of the exchanger geometrics studied, the best was found to be one in which the working substance to be boiled, freon-113 in this instance, was sprayed radially from the center of a cylindrical chamber into the other working substance, which was water. It was discovered that water-vapor contamination of the freon vapor was unavoidable but could be roughly predicted by use of the perfect gas law. It was also noted that much larger flow rates of freon could be vaporized if small amounts of liquid freon were allowed to contaminate the outlet water. A theory was developed, based on the energy balance equation for the process, and using the inlet and outlet flow rates, temperatures, and contaminations as variables. This theory proved adequate to show order-of-magnitude relationships among the process variables, but it failed to account for evaporation of the freon at low water inlet temperatures and for changes in the effectiveness of the exchanger due to modifications in the geometry of the device. (Author)

AD-292 629 Div. 13, 25
(TISTM/EJH) OTS price $6.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
SYMPOSIUM ON THE EQUATION OF STATE FOR EARTH MATERIALS,
comp. by Harold Hamada. Nov 62, 61p. incl. illus. 49 refs. (AFSWC TDR 62-126)
(Proj. 1080)
Unclassified report

DESCRIPTORS: *Equations of state, *Materials, *Structures, *Stresses, *Underground structures, *Blast, Loading, Detonation, Soils, Sand, Wave transmission, Rock, Symposia, Theory.

On 10-11 September 1962, the Structures Division of the AFSWC Research Directorate sponsored a symposium on the equation of state for earth materials. The attendants were personnel who are under contract to the Structures Division, and personnel interested in this area of research. This document contains abstracts of the papers presented at the symposium. The abstracts reflect the current theoretical and experimental efforts being undertaken by the Structures Division in the area of equation of state for earth materials. In this text ''equation of state'' means the behavior of a material under given states of stress and boundary conditions regardless of the intensity of the applied stress. Thus, the results of a conventional triaxial test will be just as appropriate as the results from a flyer-plate experiment. (Author)

AD-292 930 Div. 13, 18
(TISTE/OHD) OTS price $2.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
DESIGN FOR A CAST-IN-PLACE CONCRETE SHELTER.
Final rept.,
by J. R. Allgood, R. M. Webb, and R. F. Swalley. 13 Dec 62, 104p. incl. illus. tables, 55 refs.
(Technical rept. no. R 191)
(Proj. Y-F011-05-328)
Unclassified report

DESCRIPTORS: *Air raid shelters, *Reinforced concrete, *Underground structures, *Blast, *Radiation damage, Atomic bomb damage, Vulnerability, Pressure, Sanitary engineering, Design, Structures.

The objective was to develop an economical, arch-shaped shelter, utilizing pneumatically-placed mortar, as an alternate to existing standard types. Criteria and plans for a 100-man shotcrete shelter are presented which will provide protection against an overpressure of 100 psi and concomitant effects from nuclear weapons. Shotcrete is recommended because of the economic advantages gained from using a single lightweight form as opposed to the heavy double form required for conventionally placed concrete. Effort was made to provide a balanced and versatile design which may be adapted to the specific needs of various commands. Methods for the design of the basic structural components of the shelter are given, including a method for estimating the relative displacement between the floor and the foundation when the structure is subjected to blast loading. Simple yet adequate design procedures are given which are suitable for use in the design office. (Author)

14. MATERIALS (NON-METALLIC)

AD-291 912 Div. 14
(TISTM/ODN) OTS price $.50

Forest Products Lab., Madison, Wis.
EFFECT OF RATE OF TEMPERATURE RISE ON ADHESIVE BONDS IN STEEL.
Rept. for Apr 61-Apr 62 on Materials Application, by M. L. Selbo and R. M. Lulling. June 62, 15p. incl. illus. tables.
(Contract AF 33(616)61-06, Proj. 7381)
(ASD TDR 62-573) Unclassified report

DESCRIPTORS: *Adhesives, *Stainless steel, High temperature research, Infrared radiation, Bonded joints, Shear stresses, Stresses, Deterioration, Heat, Silicones, Epoxy resins, Tests, Bonding.

Data are presented on the effect of four different rates of temperature rise to reach 650 F. (the test temperature) when heating with infrared heat and of one rate of oven heat on the shear strength of steel lap-joint specimens bonded with three different commercial adhesives. All three adhesives showed serious reduction in shear values when heated to 650 F., and a silicone-modified epoxy was the least affected by the test conditions used. Infrared heat appeared to cause more deterioration to the adhesive bonds than oven heating. (Author)

AD-291 917 Div. 14, 17
(TISTM/TCG) OTS price $4.60

Horizons, Inc., Cleveland, Ohio.
STUDIES OF THE REINFORCEMENT OF METALS WITH ULTRA HIGH STRENGTH FIBERS (WHISKERS).
Final rept., 28 Aug 61-27 Sep 62, by Bertram C. Raynes and Robert H. Kelsey. 10 Oct 62, 44p. incl. illus. tables.
(Contract NOw 62-0235-c)
Unclassified report

DESCRIPTORS: *Nickel alloys, *Chromium alloys, *Reinforcing materials, *Ceramic fibers, *Aluminum compounds, Oxides, Composite materials, Calcium compounds, Chlorides, Wetting agents, Processing, Tensile properties, Heat resistant alloys, Sintered alloys, Alloys, Bonding, Iron alloys, Preparation.

High strength Al2O3 fibers (whiskers) have been used to reinforce 80-20 Ni-Cr alloy and Fe on a laboratory scale. The tensile strength of the Ni-Cr alloy was increased 28% by the incorporation of 3.8 wt-% Al2O3 whiskers, with corresponding lower levels of reinforcement at lower fiber loadings. The tensile strength of H-reduced Fe was increased both at room temperature and at 900 F: at room temperature the average increase, with 8% fiber loading was 34%; at 900 F the average increase with the same amount of fiber was 30%. The fibers were randomly oriented in the matrix. Some insight into the role of oxides in forming this bond has been gained by melting the metal on Al2O3 tablets and observing the resulting interactions. (Author)

AD-291 973 Div. 14, 4
(TISTM/REB) OTS price $2.60

Monsanto Research Corp., Everett, Mass.
RESEARCH ON SYNTHESIS OF 1000 F STABLE BASE FLUIDS.
Quarterly progress rept. no. 2, 1 June-31 Aug 61, by J. W. Dale, A. A. Hyatt and G. J. O'Neill. 17 Oct 61, 23p. incl. tables, 14 refs. (Rept. no. MRC 2018)
(Contract AF 33(616)7853, Proj. 1(8-7340); Continuation of Contract AF 33(616)6851)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Fluids, *Benzenes, High temperature research, Polymers, Fluorides, Fluorination, Synthesis.

Work continued on synthesis of intermediates for perfluoro-polyaromatic systems, as still offering the most promise for highly thermally stable base fluids. Specifically, effort was concentrated on (1) the synthesis of C6F6 via the electrochemical fluorination route from benzoyl chloride and (2) the preparation of a minimum one-pound sample of 1,4-dibromotetrafluorobenzene as a valuable difunctional building block. One successful series of fluorinations of benzoyl fluoride in the new 100-ampere Simons cell led to 5200 grams of crude fluorocarbon product containing some 2050 grams of the desired C6F11 COF. Using an impure C6F10, a maximum yield of 37.2% C6F6 at 12.2% conversion has been achieved in a defluorination furnace with a single heated zone. In the synthesis of 1,4-dibromotetrafluorobenzene, about three kilograms of 2,4,5-trifluoroaniline were prepared in a five-step synthesis starting from 2,5-dichloronitrobenzene. This is over three times the expected yield at this stage, and is a result of a 3-1/2-fold improved yield in one of the five steps. (Author)

AD-291 984 Div. 14, 26
(TISTM/TCG) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
COMPOSITE INORGANIC RESILIENT SEAL MATERIALS.
Progress rept. no. 7, 1 Apr-30 June 62, by F. Iwatsuki, L. L. Smith and others. 30 June 62, 22p. incl. illus. tables.
(Contract AF 33(616)7310, Proj. 1(8-7340))
Unclassified report

DESCRIPTORS: *Composite materials, *Inorganic seals, *Seals, *Metal seals, Gaskets, Rubber seals, Rings, Statics, Dynamics, Cryogenics, Shafts, Flexible shafts, Elastomers, Low pres-

sure research, High pressure research, Stainless steel, Molybdenum, Silver, Tin alloys, Fibers, Metal films, Impregnation, Nickel, Foils, High temperature research, Spaceships.

Research was conducted to investigate and develop composite materials for use as static and dynamic seals at temperatures ranging from cryogenic to 2000 F, and at pressures up to 5000 psi. Emphasis is being placed on dynamic seals for rotating and reciprocating shafts covering the temperature range -320 to 1500 F and on low temperature, low clamping force static seals for sealing the cabins of space vehicles. Efforts included high temperature evaluation of large static rings, cryogenic evaluation of static seals, dynamic fixture design, and sample preparation for the determination of mechanical properties at elevated temperatures. (Author)

AD-291 994 Div. 14
(TISTM/ODN) OTS price $8.10

Forest Products Lab., Madison, Wis.
SHEAR STABILITY OF FLAT PANELS OF SANDWICH CONSTRUCTION,
by Edward W. Kuenzi, W. S. Ericksen, and John J. Zahn. May 47, rev. May 62, 63p. illus. tables, 11 refs. (Rept. no. 1560)
(Contract AF 33(616)61-06)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Sandwich construction, Theory, Stresses, Test methods, Shear stresses, Elasticity, Buckling, Mathematical analysis.

A theoretical analysis is presented of the behavior of sandwich panels having dissimilar facings of unequal thickness when loaded in edgewise shear. Design curves are presented for simply supported panels with dissimilar facings. Approximate formulas are included for clamped panels. The analysis is compared with results of tests on 28 square panels of symmetrical isotropic sandwich constructions. Included are descriptions of testing techniques employed to induce pure shear in the test panels. A method is given for predicting the behavior at stresses exceeding proportional-limit values. (Author)

AD-292 050 Div. 14
(TISTM/RGR) OTS price $1.75

Quartermaster Research and Engineering Command, Natick, Mass.
HEAT-RETENTION PROPERTIES OF TENT LINERS,
by Constantin J. Monego and Herbert J. Rasor. Nov 62, 63p. incl. illus. tables, 35 refs.
(Textile series rept. no. 122)
(Proj. 7-71-09-011)
Unclassified report

DESCRIPTORS: *Tents, Heating, Manufacturing methods, Textiles.

Quantitative measurements are presented of the heating requirements of tents, general purpose, medium, under a wide range of windspeeds, nighttime radiation, and outdoor ambient temperatures. The relation of liner fabric thickness, air permeability, and surface reflectivity to the heating requirements of tents is discussed. The most practical liner from the standpoint of manufacture and use, and the liner showing the greatest amount of heat savings while maintaining comfort within the tent under all the environmental conditions encountered in this test, was constructed from a lightweight, thick-napped, modacrylic fabric. Results suggest that a reflective surface would improve the heat-retention properties of tent liner fabrics. (Author)

AD-292 095 Div. 14, 4
(TISTM/REB) OTS price $3.60

Monsanto Research Corp., Everett, Mass.
RESEARCH ON SYNTHESIS OF 1000 F STABLE BASE FLUIDS.
Quarterly progress rept. no. 1, 1 Mar-31 May 61, by J. W. Dale, E. A. McElhill, and G. J. O'Neill. 18 Aug 61, 24p. incl. illus. tables, 7 refs.
(Rept. no. MRC 2018)
(Contract AF 33(616)7853, Proj. 1(8-7340))
Unclassified report

DESCRIPTORS: *Fluids, *Hydraulic fluids, *Fluorides, *Benzenes, *Cobalt compounds, Fluorination, Bromides, Chlorides, Phenyl radicals, Stability, Temperature, High temperature research, Electrochemistry, Synthesis.

Research on the fluorine phase of the program has continued to be directed toward perfluoropolyaromatic structures, such as the perfluoropolyphenyl ethers, as the eventual goal for highly thermally stable base stock fluids. Three approaches to these systems are under investigation: (1) the stepwise synthesis of dibromotetrafluorobenzenes as difunctional building blocks, (2) the CoF3 fluorination process, and (3) the Simons cell route to C6F6. Under the non-fluorine phase of the program, several new compounds were prepared and eleven tested for thermal stability. 2,4,5-Triphenylthiazole showed the greatest stability (897 F). None of the heterocyclic compounds containing boron were exceptionally stable, o-phenylene-p-phenoxyphenylboronate decomposing at 858 F. (Author)

AD-292 122 Div. 14
(TISTM/RGR) OTS price $5.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
PRODUCTION OF STRONG SHOCKS IN PLASTICS BY ULTRA-SHORT IMPULSIVE LOADING,
by Arthur H. Guenther. Oct 62, 59p. incl. illus. tables, 23 refs. (Rept. no. AFSWC TDR-62-125)
(AF Proj. 5776) Unclassified report

Presented at an American Society for Testing and Materials Symposium, entitled ''Dynamic Behavior of Materials'' 27-28 Sep 62, at the University of New Mexico.

DESCRIPTORS: *Plastics, *Impact shock, Dynamics, Materials, Acrylic resins, Test methods, Transducers.

Pressures in excess of 100 kb can be produced in plastics by the impact of high velocity thin plates. These plates, mainly Mylar and Lucite in the range of 0.01 to 0.6 cm in thickness and areal dimensions to 7.5 cm square, have been accelerated by an exploding foil technique. Plates impacted at velocities approaching 500,000 cm/sec have been used for the study of material dynamics at high transient pressures. Pulse lengths in the submicrosecond-to-few-microsecond region can be produced by this technique, and the variation of the strength of materials with pulse length can be determined. A description of the technique and methods for analyzing the data are presented, including an explanation of the construction of the transducer and photographic equipment used in the laboratory for the velocity determination. Various applications of this technique are also given. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-292 152 Div. 14, 17, 4, 26
(TISTM/EJH) OTS price $4.00

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
A REVIEW OF THE AIR FORCE MATERIALS RESEARCH AND DEVELOPMENT PROGRAM.
Rept. for 1 July 61-30 June 62,
by Donna J. Tate. Nov 62, 250p. refs.
(WADC TR 53-373, suppl. no. 9)
Unclassified report

DESCRIPTORS: *Materials, *Scientific reports, *Abstracting, *Bibliography, Manufacturing methods, Metals, Refractory materials, Heat resistant alloys, Ceramic materials, Cermets, Coatings, Refractory coatings, Polymers, Plastics, Elastomers, Composite materials, Lubricants, Fuels, Aviation fuels, Hydraulic fluids, Coolants, Dielectrics, Air force research.

Abstracts of reports on basic and applied research in the materials aren being conducted by the Metals and Ceramics, Non-Metallic Materials, Physics, Manufacturing Technology, and Applications Laboratories of the Directorate of Materials and Processes are presented. (Author)

AD-292 202 Div. 14
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VISCOSITY CHARACTERISTICS OF MIXTURES OF OILS OF LUBRICANTS OBTAINED BY THICKENING THEM,
by D. S. Velikovskiy, P. L. Kazhdan and G. D. Bondarevskiy. 11 Oct 62, 14p. incl. illus. tables, 5 refs. (Trans. no. FTD-TT-62-925 from Trudy Tret'yey Vesoyuznoy Konferentsii Po Treniyu i Iznosu v Mashinakh 3:pp. 248-255, 1960)
Unclassified report

DESCRIPTORS: *Lubricants, *Oils, *Viscosity, Mixtures, Silicones, Petroleum, Polymers, Esters, Lithium, Soaps, Decomposition, Stearates, Gels, USSR, Physical properties.

The viscosity of mixtures of liquids with different chemical natures or different chemical structures was studied. The degree of viscosity depression can vary within very wide limits, depending on the chemical nature or the structure of the initial components. The degree of viscosity depression in oil mixtures increases strongly with a decrease in temperature. When mixtures of liquids of different chemical nature (silicone and petroleum oils), which exhibit viscosity derpression, are thickened with soaps (lithium stearate) and ceresin, lubricants with an anomaly (depression) of viscous resistance are formed. (Author)

AD-292 234 Div. 14, 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF THE COMPOSITION AND THE NATURE OF GASEOUS MEDIA ON THE ANTI-WEAR PROPERTIES OF PETROLEUM LUBRICATING OILS,
by M. D. Bezborod'ko, N. T. Pavlovskaya, and V. V. Arkharova. 13 Nov 62, 16p. incl. illus. tables, 16 refs. (Trans. no. FTD-TT-62-1173 from Trudy Tret'yey Vsesoyuznoy Konferentsii po Treniyu i Iznosu v Mashinakh 3:pp. 177-186, 1960)
Unclassified report

DESCRIPTORS: *Lubricants, *Oils, *Friction, *Metals, Gases, Viscosity, Naphthalenes, Lubrication, Air, Argon, Nitrogen, Oxygen, High temperature research, High pressure research, Steel, Oxidation, Oxidation-inhibitors, Hydrocarbons, Petroleum, USSR, Physical properties, Mechanical properties.

The effect of gaseous media on the lubricating capacity of oils under conditions of high pressure was studied for the case of naphthene-paraffin fractions and aromatic fractions of oils. ShKh6 and EI229 steel and BrB2 beryllium-bronze balls were employed. The antiwear properties of the lubricant materials were studied in air, Ar, N and O gaseous media. (Author)

AD-292 256 Div. 14, 4
(TISTM/EJH) OTS price $1.60

Smith, A. O., Corp., Milwaukee, Wis.
GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS.
Monthly progress rept. no. 9, 1-30 Nov 62, on Effect of Glass Surface Chemistry on Wetting, Bond Strength and Bond Life of an Epoxy Resin. May 62, 11p. incl. illus. tables, 6 refs.
(Contract NOw 62-0679-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Laminates, *Bonding, *Laminated glass, Glass, Epoxy resins, Resins, Wetting agents, Surfaces, Synthetic fibers, Water, Air, Contamination, Helium, Test methods, Bubbles.

Bond life studies continued to show the great influence of a coupling agent for increased bond life in aqueous environment. The alkali-deficient glass surface was the only example of good bond life in the absence of a coupling agent. The wetting of resin on glass was greater than water on glass, as indicated by the captive bubble technique. Wetting studies of epoxy resin on various glass surfaces were continued. Detailed information on the size and shape of an air void near the glass surface is presented. The size was found dependent primarily on the time and temperature of curing the resin. The bubble shape and size was independent of the type of glass surface because, in all trials, the captive bubble technique indicated complete wetting by the resin and was unable to differentiate the type of glass surface. Miscellaneous wetting studies are also reported. (Author)

AD-292 276 Div. 14, 1
(TISTM/REB) OTS price $2.60

General Dynamics/Fort Worth, Tex.
ACRYLIC PAINT SYSTEM - EVALUATION OF.
Report on Materials - Finishes and Coatings - Acrylic Paints,
by L. A. Mappus. 24 Apr 58, 20p. incl. illus. tables, 2 refs. (Rept. no. 57-934)
(Contracts AF 33(600)30169 and AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Acrylic resins, *Paints, *Aircraft finishes, Corrosion inhibition, Weatherproofing, Lubrication, Tests, Colors.

AD-292 277 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
QUALIFICATION TEST FOR LAMINATES OF FIBERGLAS CLOTH NO. 181 VOLAN, A. WITH U.S. POLYMERIC

C.F.R. MIL-P-8013B. TYPE I.
Report on Materials - Fiberglass Laminates - Fiberglass Cloth No. 181, Volan A - Type F.C.R. Polyester Resin (United States Polymetric Chemicals Co.),
by G. E. Gardner, Jr. 26 Nov 57, 4p. incl. tables, 1 ref. (Rept. no. 57-647)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Glass textiles, *Laminates, Manufacturing methods, Esters, Polymers, Resins, Mechanical properties, Hardness, Density, Elasticity, Tensile properties, Physical properties, Tests.

Parallel laminated panels 0.115 inch thick fabricated with 12 plies of fiberglass cloth No. 181, Volan A were impregnated with Type F.C.R. polyester resin and cured at 190 F for two hours under 10 to 12 psi vacuum bag pressure. Qualification test outcomes were as follows: (1) standard conditions: specific gravity - 2.21, resin content - 59%, barcol hardness - 62.0, flexural flatwise ultimate strength, ksi - 68.8, flexural initial modulus of elasticity, psi x 10 to the 6th power - 2.8, compression ultimate strength edgewise, ksi - 44.0, tensile ultimate strength, ksi - 40.8, and (2) wet conditions: flexural flatwise ultimate strength, ksi - 61.5, flexural initial modulus of elasticity, psi x 10 to the 6th power - 2.8, compression ultimate strength edgewise, ksi - 39.5, tensile ultimate strength, ksi - 39.6. (Author)

AD-292 278 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
FIRE RETARDANT COATINGS - LABORATORY EVALUATION OF.
Report on Materials - Finishes and Coatings - Fire Retardant Albi 99 (Albi Manufacturing Co., Ins.),
Thermo-Clad 94HA (Sherwin-Williams Co.), Duo-Tex (Glidden Co.),
by L. A. W. Mappus. 12 Mar 58, 9p. incl. illus. table (Rept. no. 57-605)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Fire resistant coatings, *Aluminum alloys, Aging, Flames, Flight simulators, Erosion, Tests, Air, Oxygen, Heat, Gases, Sheets.

Test panels of 0.125 in. x 6 in. x 6 in. bare 7075T6 aluminum alloy sheet were coated with a 19 mil thickness of Albi 99, a 20 mil thickness of Thermo-Clad No. 94HA1, or a 20 mil thickness Duo-Tex. After curing, these coatings were impinged upon with a gas-oxygen flame regulated to produce a 2100 F impingement temperature for ten minutes, and with a hydrogen burner flame adjusted to produce an impingement gas stream at 750 F and about 100 psi pressure for 10 minutes. The coatings were eroded away by the velocity of the impinging gas streams representative of flight operating conditions. (Author)

AD-292 279 Div. 14, 25
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
TOTAL REFLECTIVITY OF WEATHERED F-106 PAINT FROM 0.225 MICRONS TO 2.5 MICRONS.
Report on Materials - Finishes and Coatings - Alkyd Enamel Mil-E-7729, Grey,
by J. Trias. 9 Mar 59, 2p. incl. illus. 1 ref. (Rept. no. MP 58-436)
(Contracts AF 33(600)30169 and AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Finishes, *Enamel coatings, *Paints, Reflectometers, Reflection, Aluminum alloys, Zinc compounds, Exposure, Chromates, Measurement.

A 2 in.x2 in., clad 2024-T3 aluminum alloy sample was painted with one coat of wash primer (Mil-C-8154), two coats of zinc chromate primer (Mil-P-8585) and two coats of grey alkyd enamel (Mil-E-7729). After painting and curing indoors for one week, the panel was exposed to the south at an angle of 45 degrees to the horizontal on a roof top at Lindberg Field, San Diego, California, for seven months. After weathering, the total reflectance of the finish was measured with a Beckman Model DK-2 spectroreflectometer. The reflectivity of the material is presented in chart form. (Author)

AD-292 282 Div. 14
(TISTM/TCG) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
QUALIFICATION TEST FOR LAMINATES OF FIBERGLAS CLOTH NO. 181 VOLAN, A. WITH SHELL EPON 828, CATALYZED WITH APCO 320 MIL-P-25421, TYPE I.
Report on Materials - Fiberglass Laminates - Fiberglass Cloth No. 181 Volan A - Epon 828 Epoxy Resin (Shell Chemical Co.) - APCO 320 Catalyst (Applied Plastics Co.),
by G. E. Gardner, Jr. 18 Mar 58, 4p. incl. table, 1 ref. (Rept. no. MP-58-046)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Glass textiles, *Laminates, *Epoxy resins, Tensile properties, Stresses, Compression shock, Hardness, Mechanical properties.

Tests were made to determine the qualifications of laminates of fiberglas, Cloth No. 181, (CVAC 1000-5) impregnated with Shell EPON 828, catalyzed with APCO 320. The results of tension, compression, and flexural tests in the standard condition are given. (Author)

AD-292 285 Div. 14, 1
(TISTM/REB) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
ORGANIC COATINGS AND MATERIALS, SKYDROL 500 HYDRAULIC FLUID RESISTANCE OF.
Report on Materials - Finishes and Coatings - Sealants - Adhesives Skydrol 500 Synthetic Hydraulic Fluid Resistance,
by A. F. Hooper. 19 Mar 59, 8p. incl. tables, 1 ref. (Rept. no. MP 58-080)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Organic coatings, *Sealing compounds, *Paints, *Paint primers, *Epoxy resins, Hydraulic fluids, Resistance.

The resistance of various organic materials to Skydrol 500 hydraulic fluid immersion was investigated. The Skydrol 500 hydraulic fluid resistance of some organic materials was improved by overcoating with an epoxy enamel topcoat. Significant improvement was obtained only on those materials which had some initial resistance to Skydrol 500 hydraulic fluid. (Author)

AD-292 286 Div. 14, 1
(TISTM/REB) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
QUALIFICATION TEST FOR LAMINATES OF FIBERGLAS CLOTH NO. 181 VOLAN, A, WITH TREVARNO F-140-11 RESIN MIL-P-8013C, TYPE I.
Report on Materials - Fiberglass Laminates - Fiberglass Cloth No. 181 Volan A - Trevarno F-140-11 Polyester Resin, Specification Mil-P-8013C Qualification,
by G. E. Gardner, Jr. 3 Apr 58, 4p. incl. tables, 1 ref. (Rept. no. MP-58-111)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Laminates, *Glass textiles, Mechanical properties, Esters, Resins.

Fiberglass laminate 0.130 inches in thickness fabricated with 12 plies of No. 181 Volan A fiberglass cloth impregnated with Trevarno F-140-11 polyester resin (Coast Manufacturing and Supply Co., Livermore, Calif.) was cured by the vacuum bag process for 2 hr at 190 F under a pressure of 10 to 12 psi. (Author)

AD-292 287 Div. 14, 10
(TISTM/EJH) OTS price $3.60

General Dynamics/Convair, San Diego, Calif.
FAIRPRENE INTEGRAL FUEL TANK SEALING MATERIAL - SWELLING CHARACTERISTICS OF.
Report on Materials - Sealants - Fairprene 5570 (E. I. du Pont de Nemours and Co., Wilmington, Delaware) Aviation Fuel Immersion Swelling Characteristics,
by H. Mark. 18 Nov 58, 30p. incl. illus. tables, 16 refs. (Rept. no. MP 58-112)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Rubber seals, *Fuel tanks, *Aviation fuel, *Sealing compounds, Synthetic rubber, Benzenes, Anilines, Toluenes, Test methods.

The swelling characteristics of Fairprene 5570, a Neoprene G. N. synthetic rubber immersed in ten aviation fuels, and ten toluol (aromatic hydrocarbon) - aviation fuel mixtures were measured by volume displacement, weight gain and length increase methods. A relationship was established between these methods. Analine points of the aviation fuels were obtained, and a relationship between the analine point and swelling was established. A field test using the length increase of a ten inch strip of material as a measure of swelling was devised. Equilibrium swelling and the rate of swelling were found to increase with increasing aromatic content of temperature of fuels. Swelling increased as the analine point of the fuel was lowered, and in general the logarithm of the equilibrium swelling varied inversely with the analine point of the aviation fuel. (Author)

AD-292 288 Div. 14
(TISTM/REB) OTS price $1.10

General Dynamics/Fort Worth, Tex.
QUALIFICATION TEST FOR LAMINATES OF FIBERGLASS CLOTH NO. 181 VOLAN, A. WITH POLYLITE 8000. MIL-P-8013C, TYPE I.
Report on Materials - Fiberglass Laminates - Fiberglass Cloth No. 181 Volan A - Polylite 8000 Polyester Resin (Reichold Chemicals Co.) Specification Mil-P-8013C Qualification,
by G. E. Gardner, Jr. 16 Apr 58, 4p. incl. tables, 1 ref. (Rept. no. MP-58-120)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Laminates, Glass textiles, Esters, Resins, Polymers, Tests.

Fiberglass laminate 0.120 inches in thickness fabricated with 12 plies of No. 181 Volan A fiberglass cloth impregnated with Polylite 8000 polyester resin was cured by the vacuum bag process for two hours at 190 F under a pressure of 10 to 12 psi. Laminates of fiberglass cloth No. 181 (CVAC 1000-5) and polylite 8000 satisfactorily conformed to mechanical properties requirements of MIL-P-8013C, Type I. (Author)

AD-292 289 Div. 14, 26
(TISTM/REB) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
GREASE EVALUATION - ANTI-FRICTION CONTROL BEARING LUBRICATION.
Report on Materials - Fuels and Lubricants - Anti-Friction Bearing Grease - Supermil M-100 Regular and Roll Milled, M-40 Regular (Standard Oil Company of Indiana) Versilube 300 (General Electric Co.),
by R. R. Reschan. 23 Apr 58, 3p. 1 ref. (Rept. no. MP-58-130)
(Contracts AF 33(600)30169 and AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Greases, *Bearings, High temperature research, Lubricants.

The change in the consistency of Supermil M-100 Regular and Roll Milled and M-40 Regular (Standard Oil Company of Indiana), and Versilube 300 (General Electric Company) anti-friction bearing greases was visually and manually checked after heating successively at 210, 220, 300, 350 and 400 F for 20 hours at each temperature. (Author)

AD-292 291 Div. 14
(TISTM/REB) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
QUALIFICATION TEST FOR LAMINATES OF FIBERGLAS CLOTH NO. 181 VOLAN, A, WITH U.S. POLYMERIC-FR MIL-P-8013C, TYPE I.
Report on Materials - Fiberglass Laminates - Fiberglass Cloth No. 181 Volan A - Type FR Polyester Resin (U.S. Polymetric Chemicals Co.) Specification Mil-P-8013C, Type I. Qualification,
by G. E. Gardner, Jr. 12 May 58, 4p. incl. tables, 1 ref. (Rept. no. MP-58-131)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Laminates, Glass textiles, Polymers, Esters, Resins, Mechanical properties, Tests.

Laminated panels 0.130 inch thick fabricated with 12 plies of fiberglass cloth No. 181, Volan A were impregnated with Type FR polyester resin (United States Polymetric Chemicals Co., Stamford, Conn.) and cured at 190 F for 2 hours under 10 to 12 psi vacuum bag pressure. Qualification test outcomes (Mil-P-8013C) were as follows: (1) standard conditions: specific gravity - 1.98; resin content - 39.4%; barcol hardness - 67.0; flexural flatwise ultimate strength, ksi - 68.8, flexural initial modulus of elasticity, psi x 10 to the 6th power - 2.9; compression ultimate strength, edgewise, ksi - 45.0; tension ultimate strength, ksi - 40.9; (2) wet conditions: flexural flatwise ultimate strength, ksi - 50.4; flexural initial modulus of elasticity, psi x 10 to the 6th power - 2.7; compression ultimate strength, edgewise, ksi - 33.1; tension ultimate strength, ksi - 38.3. (Author)

AD-292 292 Div. 14
(TISTM/REB) OTS price $1.10

General Dynamics/Fort Worth, Tex.
SELECTION OF CANOPY SEAL ANTI FREEZE LUBRICANT.
Report on Materials - Fuels and Lubricants - Anti-Freeze Lubricants Seizure Characteristics at Low Temperatures,
by A. P. Mizisin and R. R. Reschan. 22 Sep 58, 4p. incl. illus. table, 1 ref. (Rept. no. MP 58-140)
(Contracts AF 33(600)30169 and AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Lubricants, *Freezing point depressants, *Aluminum alloys, *Low-temperature lubricants, Water, Glycerols, Petroleum, Silicones, Oils, Low temperature research.

The shearing force required for breakaway of a 12 x 12 inch 7075-T6 aluminum alloy plate supported at two of its edges by the flanges of 1 x 1 inch 7075-T6 aluminum alloy angles and separated from them with anti-freeze lubricants was used to estimate the seizure characteristics of the various lubricants. During test, a block of solid carbon dioxide was placed on the 12 x 12 inch plate to induce a low temperature at the sliding surfaces. The lubricants tested were water, glycerol, petrolatum, Dow Corning DC silicone oil, n-hexanol and ethyl propionate. The breakaway forces for each lubricant were as follows: water, 45.0 lb.; glycerol, thin film, 43.2 lb.; glycerol, thin film, 43.2 lb.; thick film, 15.8 lb.; petrolatum, thin film, 13.1 lb.; petrolatum, thick film 32.3 lb.; DC-4 silicone oil, thick film, 6.6 lb.; n-hexanol, 17.6 lb.; and ethyl propionate, 18.0 lb. (Author)

AD-292 293 Div. 14, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
ADHESION OF SCOTCH-WELD AF31 ADHESIVE TO CADMIUM PLATED STEEL.
Report on Materials - Finishes and Coatings - Cadmium Plate Chemical Surface Treatment - Iridite no. 8 (Allied Research Products Inc.) Effect of Iridite no. 8 Coatings on Cadmium Plated 4130 Steel on The Strength of Adhesive Bonds Made With Minnesota Mining and Manufacturing Co. AF-31 Adhesive,
by H. R. Barringer. 11 Aug 58, 4p. incl. table, 1 ref. (Rept. no. MP 58-167)
(Contracts AF 33(600)30169 and AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Adhesives, *Adhesion, *Cadmium plating, *Steel, Bonding, Bonded joints, Salts, Sea water, Sprays, Shear stresses, Tensile properties, Pressure, Processing, Tests, Coatings.

Cadmium plated normalized 4130 steel panels for tensile shear and peel tests were treated with Iridite #8 chemical surface treatment and EC1459 primer applied at faying surfaces. Joints were made by sandwiching AF-31 adhesive between prepared faying surfaces and curing the assemblies for one hour at 350 F under a pressure of 100 psi. After bonding, joints were tested as bonded and after 168 hours of exposure to salt spray atmosphere. The shear strengths found with joints made as described are as follows: as bonded; at room temperature, 3630 lbs., at 67 F, 2510 lbs.; at 300 F, 1930 lbs.; and after salt spray exposure; at room temperature, 3670 lbs.; at 67 F, 2760 lbs.; at 300 F, 1760 lbs. Peel strengths of 12 pounds or slightly above resulting from 5, 10, 15 and 20 seconds immersion of cadmium plated 4130 steel in Iridite #8 solution indicated a degree of processing latitude required in production. The shear strengths conformed with Specification Mil-A-9067B requirements. (Author)

AD-292 296 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
TEST OF MIL-P-5516 SEALS FOR COMPATIBILITY WITH ETHYLENE GLYCOL.
Report on Materials-Elastomer-Petroleum Hydraulic Fluid Resistant-O-Rings (E. B. Wiggins Oil and Tool Co.),
by A. P. Mizisin and R. R. Reschan. 22 Sep 58, 9p. incl. illus. tables, 1 ref. (Rept. no. MP 58-258)
(Contracts AF 33(600)33695 and AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Elastomers, *Rings, *Seals, Fluids, Ethylenes, Glycols, Exposure, Elasticity, Tests, Sealing compounds.

The weight and elongation of O-rings immersed in ethylene glycol at 150 and 350 F for 24 hours, 48 hours and 10 days were determined. O-rings immersed in ethylene glycol at 150 and 200 F for 24 hours and for 10 days did not show any appreciable change in elongation although a 2.2 to 2.5% weight gain at 150 F and both gain and loss (2 specimens) of about 5% at 200 F was observed in 24 hours. Exposure at 350 F caused the O-rings to lose their elasticity. (Author)

AD-292 297 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
CARGO COMPARTMENT LINER MATERIAL FIRE RESISTANCE TEST.
Report on Material - Insulation - Sound Deadening Neoprene Coated Fiberglass - Fiberglass Cloth FS 821 (B. F. Goodrich Co.) Fire Resistance,
by H. H. Hunt. 9 Feb 59, 1p. 1 ref. (Rept. no. MP 58-473)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Glass textiles, *Rubber coatings, *Insulating materials, *Fire resistant coatings, Synthetic rubber, Flames, Fire resistant textiles, Tests.

The fire resistance of FS 821 neoprene coated fiberglass cloth was tested. The test consisted of thirty seconds impingement by a Bunsen burner adjusted for a yellow tipped 1-1/2 inch flame which was directed at an angle of 45 degrees in a draft free area upon the center of an 8 x 8 inch piece of material. This impingement did not penetrate into the material, and when the flame source was removed the specimen flame extinguished itself at once and continued glowing; smoldering was not observed. The neoprene coating charred during test, but the fiberglass remained intact. (Author)

AD-292 298 Div. 14
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE AF31 AND PLASTILOCK 650 - SHEAR STRENGTH OF - EFFECT OF HEAT INPUT DURING CYCLE ON.
Test data memorandum,
by Floyd De Leon, Jr. 9 Nov 62, 19p. incl. illus. tables (Rept. no. FTDM-1924)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Aluminum alloys, *Shear stresses, *Sandwich panels, Heating, Temperature, Plastics, Low temperature research, Pressure, Bonding.

Research was conducted to determine the effect that various times taken to reach cure temperature has on the lap shear strength of AF-31 and Plastilock 650 adhesive bonded specimens. These tests indicate that varying the rate and amount of heat input during the bond cycle causes a maximum difference in the shear strength of AF-31 bonded 2024-T86 alclad Al lap shear specimens of 997 psi when tested at 260 F, 1338 psi when tested at -67 F, and 483 psi when tested at room temperature. The maximum difference in the shear strength of the Plastilock 650 bonded specimens was 845 psi when tested at 260 F, 1671 psi when tested at -67 F, and 578 psi when tested at room temperature. These represent the maximum ranges of the average lap shear values from specimens bonded at 45 psi and at 150 psi. (Author)

AD-292 322 Div. 14, 11
(TISTM/TCG) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
FIELD TESTS (SEMI-STORAGE) OF MIL-H-46046 (ORD), HYDRAULIC FLUID NON-PETROLEUM BASE, AUTOMOTIVE (PRESERVATIVE AND LIMITED OPERATIONAL),
by Charles B. Jordan. 16 Nov 62, 10p. incl. tables (Rept. no. CCL 131)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Engine cylinders, *Hydraulic cylinders, Automotive industry, Hydraulic brakes, Brake linings, Tests, Storage, Stability.

A test was conducted to evaluate the field performance of MIL-H-46046 (Ord), hydraulic fluid, non-petroleum base, automotive (preservative and limited operational). The results of semi-storage tests are also discussed. (Author)

AD-292 326 Div. 14, 25
(TISTM/TCG) OTS price $.75

Cincinnati U., Ohio.
THERMAL CONDUCTIVITY OF ANISOTROPIC SOLIDS AT HIGH TEMPERATURES. THE THERMAL CONDUCTIVITY OF MOLDED AND PYROLYTIC GRAPHITES. PART I.
Rept. for Feb 61-Feb 62 on Experimental Techniques for Materials Research,
by Michael Hoch and Joseph Vardi. Nov 62, 19p. incl. illus. tables, 12 refs.
(Contract AF 33(616)7123, Proj. 7364)
(ASD TDR 62-608, pt. 1) Unclassified report

DESCRIPTORS: *Graphite, *Solids, *Thermal conductivity, Test methods, Measurement, Test equipment, Thermodynamics, Heat transfer.

A method was developed for the determination of the thermal conductivities of anisotropic solids under conditions of two-dimensional, steady-state heat conduction in a cylinder of finite length heated in vacuum by high frequency induction and radiating heat to the surroundings. The method was used to determine the radial thermal conductivity, k sub r, and the axial thermal conductivity, k sub z, of molded ZT type and pyrolytic graphite in the temperature range 1200-2200 K. For ZT type graphite k sub z/k sub r = -0.10116 + 2.00191 x 10 to the 4th power x T (1260 K < T < 2199 K); for pyrolytic graphite, k sub z/k sub r = 0.0376 at 1817 K. (Author)

AD-292 929 Div. 14
(TISTM/REB) OTS price $8.10

Bell Aerosystems Co., Buffalo, N. Y.
VACUUM CONSIDERATIONS OF SPACE ENVIRONMENT,
by Paul F. Forsyth. 15 Jan 62, 74p. incl. illus, tables, 47 refs. (Rept. no. 8500-920002)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Space environmental conditions, *Materials, *Plastics, *Metals, *Oxides, *Lubricants, *Vacuum systems, Simulation, Seals, Rubber seals, Nylon, Butyl rubber, Ethylenes, Polymers, Vinyl chlorides, Styrenes, Synthetic rubber, Silicone resins, Nitrile rubber, Low pressure research.

An introduction to vacuum terminology, the physical constants and concepts of space vacuum is presented. The effects of vacuum on plastics and elastomers, metals, oxides, and lubricants are discussed. The physical considerations and problems associated with space simulation are presented together with a facility listing to give an insight into the state-of-the-art. The data cited in the report are based on a comprehensive search of the available literature and review articles. (Author)

AD-293 160 Div. 14, 4
(TISTM/SJR) OTS price $1.10

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DETERMINATION OF PHTHALIC ANHYDRIDE IN ALKYD RESINS BY TRANSESTERIFICATION AND GAS CHROMATOGRAPHIC SEPARATION,
by G. Esposito. 20 Nov 62, 7p. incl. table,
(Rept. no. CCL 132)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Chromatographic analysis, *Resins, Dibasic acids, Phthalic acids, Anhydrides, Gases, Coatings.

A gas-liquid chromatographic method was developed for the determination of phthalic anhydride in coating resins which is not affected by the presence of other dibasic acids. A qualitative chromatographic method developed in this laboratory was modified to produce quantitative results. The resin is subjected to transesterification with lithium methoxide and phthalic anhydride is determined as dimethyl phthalate using an internal standard. (Author)

AD-293 219 Div. 14, 17
(TISTM/REB) OTS price $.50

Metals and Ceramics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
WEATHER EXPOSURE DATA FOR HIGH TEMPERATURE COATINGS ON CHROMIUM HOT-WORK TOOL STEELS.
Final rept. for Jan 57-Apr 62 on Finishes and Materials Preservation,
by G. William Lawless. Nov 62, 13p. incl. tables, 2 refs.
(Proj. 7312)
(ASD TDR 62-888) Unclassified report

DESCRIPTORS: *Corrosion inhibition, *Tool steel, *Metal coatings, *Nickel plating, Alloys, Chromium, Chromium alloys, Oxidation inhibitors, Sea water, Thermal stresses, Tensile properties, Stresses, Rupture, Fatigue

(Mechanics), Weatherproofing, Abrasion, Antioxidants, Tin coatings, Zinc coatings, Aluminum coatings, Silicones, High temperature research, Coatings, Effectiveness, Steel.

Results are reported of a 4 1/2 - yr continuous exposure of coated Thermold J steel (SAE H-11) at Kure Beach, North Carolina. Eleven coatings were tested in various modifications, thicknesses, and pre-exposure thermal treatments. A nickel-zinc coating provided the best protection from corrosion during this type of exposure. A summary is included of the oxidation, mechanical, and short term corrosion tests conducted on these same coatings by Metcut Research Associates in 1957, during which investigation of the coated steel specimens were placed on exposure at Kure Beach. (Author)

AD-293 234 Div. 14, 8
(TISTM/ODN) OTS price $2.60

Motorola, Inc., Chicago, Ill.
CONFORMAL COATINGS FOR PRINTED CIRCUIT ASSEMBLIES.
Quarterly rept. no. 5, 16 July-31 Oct 62, by Anthony J. Beccasio. 31 Oct 62, 19p. incl. illus.
(Contract DA 36-039-sc-89136, Proj. 5999-004)
Unclassified report

DESCRIPTORS: *Printed circuits, *Coatings, *Plastic coatings, *Resins, *Laminates, Epoxy resins, Acrylic resins, Styrenes, Polymers, Laminated glass, Aging, Surfaces, Cleaning, Humidity, Adhesion, Thickness, Preparation, Physical properties, Electrical properties.

Investigation of one-component epoxy, acrylic, and polystyrene-based coating compounds for use as conformal coatings on Type GB glass-epoxy laminate was conducted. To eliminate all corrosion effects other than those from the testing or the coating itself, a stepwise cleaning technique for the surface of the specimen panel was devised. A visual check of the coated test panels revealed no evidence of blistering, wrinkling, cracking and peeling of coating and no corrosion of printed conductors. All coatings showed good adhesion to specimen test panels. The effects of the thickness of coatings on insulation resistance and Q-factor under prolonged humidity conditions were studied. The effects of coatings on copper, gold and solder-plated conductors with respect to their effect on Q-factor and capacity at 1, 50 and 100mc were also studied. (Author)

AD-293 402 Div. 14, 26
(TISTM/RGR) OTS price $2.25

Structural Mechanics Research Lab., U. of Texas, Austin.
PRELIMINARY STUDIES OF AGGREGATES FOR SHOCK ISOLATING LIGHTWEIGHT CONCRETE,
by Eugene F. Smith, Ervin S. Perry and J. Neils Thompson. Aug 62, 75p. incl. illus. tables, refs.
(Contract DA 49-146-xz-028)
(DASA 1319) Unclassified report

DESCRIPTORS: *Concrete, *Vibration isolators, Vermiculite, Physical properties, Test methods.

A study was made to determine a reliable method for obtaining the specific gravity and absorption capacity of lightweight aggregates whose bulk specific gravity is less than 1.0, so that these values could be used to predict the per cent voids in a lightweight concrete mix. Using the batch weights from a lightweight vermiculite concrete mix used in previous reports, a mix was made. After the mixing operation was completed, the void content (air content) of the mix was measured with a Washington air meter. The yield for the mix was also measured. Then, using the values of specific gravity and absorption capacity obtained for vermiculite aggregate and using the measured value for the yield, the per cent absolute volumes of the ingredients, including the void content, were calculated. The calculated value of the per cent voids compared favorably with the measured value. A preliminary investigation was also made to evaluate the effect of the degree of saturation on the energy-absorption properties of lightweight vermiculite concrete, by using values obtained for void content and absorption capacity. (Author)

AD-293 405 Div. 14, 4, 25, 9
(TISTM/EJH) OTS price $10.10

Plastics Lab., Princeton U., N. J.
THE DEFORMATION MECHANISMS IN BRANCHED POLYETHYLENE MELTS,
by James C. Galt and Bryce Maxwell. 31 Aug 62, 84p. illus. 3 refs. (Technical rept. no. 66C)
(Contract DA 36-039-sc-89143, Proj. 356-375)
Unclassified report

DESCRIPTORS: *Polymers, *Ethylenes, *Deformation, *Plastics, *Melting, Viscosity, Elasticity, Stresses, Resins, Shear stresses, Velocity, Molecular structure, Molecular weight, Theory, Melting.

A program was undertaken to determine point to point response to stress of a high polymer above its crystalline melting point. From these observations, the actual velocity profiles for branched polyethylene melts in a capillary were obtained. Explanation for the unique character of the velocity profiles must be based on considerations of the molecular structure of each polymer. Velocity within the capillary depends not only on the location of the point of interest but also on which representative infinitesimal element of the melt is under consideration. A boundary annulus is next to the wall. It contains the stick-slip at the wall, zero velocities away from the wall, and pure translation (no rotation). The cause of the highly elastic, discontinuous flow of polymer in this region may be attributed to long-chain branching. A plug of elastically-strained structure is found at the centerline of the capillary. The plug flows at a uniform time-average velocity. The shear annulus is the region between the plug and the boundary annulus. Flow in this region is viscous or viscoelastic but shows structural breakdown and the thixotropic nature of polymer melts. (Author)

AD-293 412 Div. 14, 25
(TISTM/TCG) OTS price $4.60

Forest Products Lab., Madison, Wis.
CALCULATION OF VIBRATION DAMPING IN SANDWICH CONSTRUCTION FROM DAMPING PROPERTIES OF THE CORES AND FACINGS,
by William L. James. Dec 62, 30p. illus. tables.
(Rept. no. 1888)
(Contract AF 33(616)6106)
Unclassified report

DESCRIPTORS: *Sandwich construction, *Honeycomb cores, *Aluminum alloys, *Aluminum, Vibration, Elasticity, Energy, Absorption, Adhe-

sives, Stresses, Stainless steel, Nickel alloys, Test equipment, Frequency, Generators, Capacitors, Damping.

The natural frequency and log decrement of free vibration in strips of structural sandwich were predicted from data on the elastic properties and energy absorption in direct stress vibration in the facing material and shear vibration in the core materials. The sandwich specimens evaluated had facings made of soft Al and Al alloys designated as 2024-T3 and Al honeycomb cores. The amount of adhesive used to assemble the sandwich strongly affected its vibration properties. If the amount of adhesive in the sandwich was approximately the same as that used in specimens for determining the shear properties of the cores alone, however, the properties of the sandwich could be calculated with fair accuracy. A riveted strip was compared with sandwich of similar mass, length, and stiffness and found to have substantially lower damping capacity. Shear vibration properties also were determined for several honeycomb cores of Al, stainless steel, and Ni-base alloy. (Author)

AD-293 437 Div. 14, 26
(TISTM/RGR) OTS price $9.10

Institute of Paper Chemistry, Appleton, Wis.
DEVELOPMENT OF AN IMPROVED DIFFUSION BOARD MATERIAL.
Final comprehensive rept. no. 24,
by L. E. Leporte and T. A. Howells. 19 Dec 62, 104p. incl. illus. tables.
(Contract DA 18-108-405-cml-941 and DA 18-108-cml-6561)
Unclassified report

DESCRIPTORS: *Fiberboard, *Diffusion, *Aerosols, Insulating materials, Poisonous gases, Cyanogen chlorides, Deterioration, Production, Tropical deterioration, Chemical warfare.

Improvements of diffusion board on a laboratory and commercial basis were studied. Using pulps commercially available in the insulation board industry, there seemed to be no difficulty in the laboratory in producing boards with the desired density, diffusivity, and resistance to penetration of aerosols and with strength equivalent to normal practice in insulation board. Protection against toxic gases as represented by chloropicrin was also obtained but protection against cyanogen chloride was more critical. By utilizing well-washed pulp and alkaline sizing materials, adequate resistance to cyanogen chloride could be obtained. Under desert aging conditions this protection was fairly stable, but under tropical aging conditions the cyanogen chloride protection deteriorated rapidly. It was found that drying conditions were critical, both with respect to fire hazard and with respect to preservation of adequate resistance to cyanogen chloride. By maintaining maximum air circulation and a drying temperature of approximately 300 F, a fairly successful production run was made without fires. (Author)

AD-293 486 Div. 14, 25
(TISTM/ODN) OTS price $1.10

Systems Research Labs., Inc., Dayton, Ohio.
THE ELECTRICAL BEHAVIOR OF REFRACTORY OXIDES.
Bi-monthly progress rept. no. 5, Sep-Oct 61,
by Robert W. Vest. 20 Nov 61, 7p. incl. illus.
(Rept. no. 203-5)
(Contract AF 33(616)7748)
Unclassified report

DESCRIPTORS: *Ceramic materials, *Refractory materials, *Oxides, Crystals, Zirconium compounds, Polarization, Transport properties, Ions, Electrical conductance, Conductivity, Oxygen, Calcium compounds, Diffusion, Single crystals, Chlorides, High temperature research, Vacuum systems, Titanium compounds, Electrons, Electrical properties.

Studies of calcia stabilized zirconia in high vacuum were continued. Transport numbers for ions were calculated from polarization measurements over the temperature range 300 to 1100 C. In agreement with earlier measurements, the electronic contribution to the total electrical conductivity was found to be significant only at temperatures below 500 C. From the conductivity data above 500 C, an activation energy of 1.132 ± .015 electron volts was calculated by the method of least squares, the variation indicated being the probable error computed from the scatter of points about the least squares line. Oxygen ion diffusivities in the stabilized zirconia sample were calculated from the conductivities and transport numbers. (Author)

AD-293 487 Div. 14, 25
(TISTM/EJH) OTS price $1.10

Systems Research Labs., Inc., Dayton, Ohio.
THE ELECTRICAL BEHAVIOR OF REFRACTORY OXIDES.
Quarterly progress rept. no. 7, Jan-Mar 62,
by Robert W. Vest. 16 Apr 62, 8p. incl. illus.
(Rept. no. 203-7)
(Contract AF 33(616)7748)
Unclassified report

DESCRIPTORS: *Refractory materials, *Ceramic materials, *Oxides, Aluminum compounds, Zirconium compounds, Chromium compounds, Conductivity, Dielectric properties, Phase transistors, Solids, Solutions, Oxygen, Pressure, Preparation, Thermoelectricity, Ions, Transport properties, Test equipment, Electrical properties.

The broad objective of this project is to gain a mechanistic understanding of the electrical properties of various metal oxides. Both pure zirconia and zirconia stabilized with calcia are being studied. The electrical behavior in the neighborhood of the monoclinic-tetragonal transformation is of particular interest. Work was initiated to investigate the influence of cation-cation interaction on electrical conductivity in chromia-alumina solid solutions. (Author)

AD-293 488 Div. 14, 25
(TISTM/EJH) OTS price $1.60

Systems Research Labs., Inc., Dayton, Ohio.
THE ELECTRICAL BEHAVIOR OF REFRACTORY OXIDES.
Quarterly progress rept. no. 9, July-Sep 62,
by Robert W. Vest. 23 Oct 62, 14p. incl. illus.
(Rept. no. 203-9)
(Contract AF 33(616)7748)
Unclassified report

DESCRIPTORS: *Refractory materials, *Ceramic materials, *Oxides, Zirconium compounds, Aluminum compounds, Chromium compounds, Conductivity, Transport properties, Thermoelectricity, Oxygen, Low pressure research, Polarization, Electrodes, High temperature research, Ions, Test equipment, Electrical properties.

Experimental approaches included measurements of electrical conductivity, thermoelectric power and transference numbers as a function of

temperature and oxygen partial pressure. Thermogravimetric studies of the thermodynamics of vacancy formation are in progress. A technique was developed for measuring transport numbers in a mixed conductor. The method employs an electrode configuration which also permits measurement of total conductivity and thermoelectric power to very high temperatures under any desired oxygen partial pressure. (Author)

15. MATHEMATICS

AD-291 954 Div. 15, 20, 25
(TISTW/PCR) OTS price $3.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
A REFORMULATION OF THE THEORY OF PAIRING CORRELATIONS,
by Michel Baranger. Nov 62, 36p. refs. (Technical rept. no. 10)
(Contract Nonr-76015)
Unclassified report

DESCRIPTORS: *Pair production, Correlation techniques, Matrix calculus, Differential equations, Operators (Mathematics), Matrix algebra, Integral equations, Theory.

A variational approach to the ground state of a many-fermion system is developed with the trial function of condensed pairs proposed by Blatt. The calculation of matrix elements is done by a diagrammatic method which is much simpler than Blatt's. The method is susceptible of generalization to higher correlations. It is also shown that the theory is identical with Hartree-Bogolyubov theory. The Hartree-Bogolyubov equations are derived from the variational point of view. (Author)

AD-292 063 Div. 15
(TISTP/MAK) OTS price $1.60

California U., Los Angeles.
AN INFINITELY DIVISIBLE MARKOV PROCESS,
by Thomas S. Ferguson. Nov 62, 13p. 3 refs.
(Working paper no. 21)
(Proj. NR 047-041)
Unclassified report

DESCRIPTORS: *Probability, *Statistical processes, Time, Differential equations, Integration, Markov processes.

This paper studies the limiting distribution of a time-dependent random variable which is a Markov process with stationary transition probabilities. The model is couched in terms of an individual's resources, which decay exponentially but are incremented by random amounts at times which are Poisson distributed, but other applications are available: e. g., neuron responses. The characteristic function of the Markov process is exhibited, showing that the distribution is a generalized Poisson. The limiting distribution is shown to be the stationary distribution.

AD-292 106 Div. 15
(TISTP/TL) OTS price $9.10

Radiation Lab., U. of Michigan, Ann Arbor.
STUDIES IN NONLINEAR MODELING V: NONLINEAR MODELING FUNCTIONS OF A SPECIAL TYPE.
Doctoral thesis,
by Otto George Ruehr. Aug 62, 101p. incl. illus. 11 refs. (Rept. no. 3648-5-T; Scientific rept. no. 2)
(Contracts AF 19(604)6655, AF 19(604)4993, and AF 19(604)7428)
(AFCRL 62-573) Unclassified report

DESCRIPTORS: *Partial differential equations, *Real variables, *Nonlinear differential equations, *Series, *Bessel functions, *Polynomials.

This paper discusses the nonlinear modeling of three types of partial differential equations in n variables, elliptic, parabolic, and hyperbolic. The modeling functions are restricted to depend only on the (measured) dependent variable and not on the coordinates. For the scalar wave equation (elliptic) and the diffusion equation (parabolic) it is found that the allowable modeling functions must satisfy a particular n'th order nonlinear ordinary differential equation. A simple counter-example shows that similar restrictions do not hold for the time-dependent wave equation (hyperbolic). The sets of allowable modeling functions corresponding to the wave and diffusion equations are shown to be identical to those obtained by modeling certain second order linear ordinary differential equations. The problem of similitude restrictions is interpreted as the study of certain polynomials generated by Burmann series expansions. The limiting behavior of these polynomials is obtained in special cases. (Author)

AD-292 125 Div. 15
(TISTB/DGH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
ON PERFECT ERROR-CORRECTING CODES,
by Selmer Johnson. Dec 62, 20p. 6 refs.
(Memo. no. RM-3403-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Coding, Information theory, Corrections, Errors, Mathematical logic, Factor analysis.

The problem of finding perfect, or close-packed, binary error-correcting codes is studied. Only a few types of such codes are known, and it is conjectured that there are no others. Necessary conditions for the existence of such codes have been developed but they are usually hard to apply. The present note develops further conditions which are more concise and enable one to show, for example, that there are no perfect codes other than the trivial majority-rule ones for correcting odd numbers of errors from 5 to 29. (Author)

AD-292 191 Div. 15
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONCERNING ONE CASE OF DEPENDENCE OF DELAY ON FUNCTION BEING SOUGHT,
by S. B. Norkin. 29 Oct 62, 13p. incl. illus. 9 refs. (Trans. no. FTD-TT-62-1287 from Zhurnal Vychislitel'noy Matematiki I Matematicheskoy Fiziki 2:2, pp. 343-348, Mar-Apr 1962)
Unclassified report

DESCRIPTORS: *Differential equations, Translations, Functions, Delay elements, Electromagnetic theory, Velocity, Frequency, Oscillation.

Division 15 - MATHEMATICS

AD-292 609 Div. 15
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE STUDY OF CORRELATED RANDOM VALUES,
by G. A. Stepan'Yants. 13 Nov 62, 7p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-1191 from Voprosy Avtomaticheskogo Regulirovaniya Dvizhushchikhsya Ob'yektov, Oborongiz, Moscow, Issue 139, pp. 129-133, 1961)
Unclassified report

DESCRIPTORS: *Statistical functions, *Probability, *Statistical analysis, Theory.

AD-292 638 Div. 15, 25
(TISTP/TL) OTS price $1.60

North Carolina State Coll. School of Physical Sciences and Applied Mathematics, Raleigh.
A DISCUSSION OF THE DUFFING PROBLEM,
by Raimond A. Struble. Dec 62, 12p. incl illus. 2 refs. (Rept. no. PSR-14; Technical memo. no. 5)
(Grant DA-ARO(D)-31-124-G81)
(AROD 2125:27)
Unclassified report

DESCRIPTORS: *Differential equations, *Integral equations, *Perturbation theory, *Mechanics, Matrix algebra, Real variables, Inequalities, Functions, Linear systems.

AD-292 670 Div. 15
(TISTW/PCR) OTS price $3.60

California U., Berkeley.
STUDY OF A CONSERVATIVE ALGEBRAIC TRANSFORMATION SYMMETRIC WITH RESPECT TO AN INVOLUTION. PART I,
by Rene De Vogelaere. Sep 62, 32p. incl. tables, 4 refs. (Technical rept. no. 62-1)
(Contract Nonr-22280, Proj. NR 044-249)
Unclassified report

DESCRIPTORS: *Transformations (Mathematics), *Topology, Differential equations, Operators (Mathematics), Tables, Algebra.

The purpose of this report is to study a simple area preserving transformation of the plane into itself, X = y + x2 squared, Y = -x + X2 squared, to obtain some specific information about periodic points and their stability, invariant curves, etc. It is the hope that such an investigation will lead to criteria for transitivity and other new results in this field. (Author)

AD-292 671 Div. 15
(TISTW/PCR) OTS price $2.60

California U., Berkeley.
CLASSIFICATION OF FIXED POINTS OF SOME ALGEBRAIC TRANSFORMATIONS WITH APPLICATION,
by George Bergman. Sep 62, 15p. incl. tables. (Technical rept. no. 62-2)
(Contract Nonr-22280, Proj. NR 044-249)
Unclassified report

DESCRIPTORS: *Transformations (Mathematics), Functions, Polynomials, Operators (Mathematics), Classification, Algebra.

Group considerations are presented which underly classification of fixed points of transformations symmetric with respect to an involution.

AD-292 677 Div. 15, 30
(TISTW/PCR) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
FAILURE TOLERANCE IMPROVEMENT IN PARALLEL CORE MEMORIES BY MEANS OF WORD SPLIT TECHNIQUE,
by A. Holick. 1 Dec 62, 17p. incl. illus. tables. (Rept. no. SRS-597)
(Contract AF 04(695)210)
Unclassified report

DESCRIPTORS: *Memory devices, Failure (Mechanics), Ferrite cores, Reliability, Coding, Theory, Mathematical analysis, Computers.

A method is presented for improving the failure tolerance level in parallel random access core memories. It is shown that degraded operational modes can be organized with almost no additional hardware in the memory and that the probability of 100 percent memory failure can be significantly reduced. The gain in cost or reliability depends on several parameters, such as partitioning in the original organization, redundancy factor, contents of the memory (data or instructions) and memory allocation. (Author)

AD-292 688 Div. 15, 8
(TISTP/MAK) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
COMPUTER CONTROLLED AND MODEL-REFERENCED ADAPTIVE FEEDBACK CONTROL SYSTEMS.
Final rept.,
by J. J. Bongiorno, Jr. 31 Oct 62, 28p. incl. illus. 5 refs. (Rept. no. PIBMRI-1085-62)
(Grant DA-ARO(D)-31-124-G201)
(AROD 2268:12) Unclassified report

DESCRIPTORS: *Servomechanisms, *Differential equations, Cmplex variables, Series, Control systems, Electronic circuits.

A Nyquist-like stability criterion in conjunction with a simple substitution is utilized to establish convergence properties of linear time-varying systems. The results obtained are applied to a model-reference adaptive control system, and an allowable range of process gain variation is established for which system convergence within a specified time interval is guaranteed. The relationships obtained for the model-reference adaptive control system permit a complete design of the system. (Author)

AD-292 691 Div. 15, 30
(TISTP/MAK) OTS price $5.60

George Washington U., Washington, D. C.
NUMERICAL EXPERIMENTS WITH AN INFINITE ALGORITHM FOR SOLVING A MATRIX GAME,
by Martin Hershkowitz. 27 Dec 62, 44p. incl. tables, 5 refs. (Serial no. T-153)
(Contracts Nonr-76103, Proj. NR 345 107, Nonr-76105, Proj. NR 047 001 and Nonr-76106, Proj. NR 347 008)
Unclassified report

DESCRIPTORS: *Games theory, *Numerical methods and procedures, *Digital computers, *Linear programming, Matrix algebra, Experimental data.

This paper is concerned with an algorithm of von Neumann's for solving a matrix game. Numerical experiments are described which deal with some basic smoothing techniques designed to improve the algorithm by increasing its rate of convergence. Certain additional calculations

are described which deal with the deletion of obvious dominance in the pay-off matrix as a possible aid in further increasing the rate of convergence. Some numerical comparisons are made between this algorithm and three others from the literature. In general, the performance of von Neumann's algorithm is quite inferior to other methods for solving matrix games: Dantzig's Simplex Method converges in fewer iterations and Brown's Fictitious Play requires a much simpler arithmetic process and fewer iterations for a similar convergence. (Author)

AD-292 698 Div. 15
(TISTW/PCR) OTS price $2.60

System Development Corp., Santa Monica, Calif.
CALCULATIONS WITH PSEUDO-RANDOM NUMBERS,
by Frank Stockmal. 12 Nov 62, 22p. incl. illus. tables, 9 refs. (Rept. no. SP-1021)
Unclassified report

DESCRIPTORS: *Probability, *Numerical methods and procedures, *Numbers, Computer logic, Numerical analysis, Number theory, Equations, Functions, Differential equations, Tables, Generators.

Two pseudo-random number generators are considered, the multiplicative congruential method and the mixed congruential method. Some properties of the generated sequences are derived, and several algorithms are developed for the evaluation of x sub i = f(i) and i = f to the minus 1 power (x sub i), where x sub i is the i'th element of a pseudo-random number sequence. (Author)

AD-292 733 Div. 15
(TISTP/MAK) OTS price $2.60

Mitre Corp., Bedford, Mass.
THE INDEPENDENT SPECIFICATION OF THE MODULUS OF A FUNCTION AND THE MODULUS OF ITS FOURIER TRANSFORM,
by Evert N. Fowle. 3 Aug 62, 21p. illus. 6 refs. (Technical memo. no. TM-3361)
(Contract AF 33(600)39852, Proj. 750)
(ESD TDR 62-312) Unclassified report

DESCRIPTORS: *Fourier analysis, *Complex variables, Differential equations, Integration, Electronic circuits.

Fourier theory imposes constraints which prevent one from specifying independently and exactly the modulus of a function and the modulus of its Fourier transform. However, as the product of the 'extents' of the two moduli (or the TW product) becomes large, the constraints appear to weaken, and it is possible under certain circumstances to obtain approximate expressions for phase functions which when associated with the two moduli make an approximate Fourier pair. A method for constructing the phase characteristics is given. How large the TW product must be to give good accuracy in the approximate Fourier pair is shown to depend heavily on the shape of the moduli. When both moduli are smooth continuous functions TW products of less than 10 will give good results. When one modulus is limited in extent and the other smooth and continuous, the approximate Fourier pair can be quite accurate for TW products of the order of 10. Finally, when both moduli are required to be limited in extent (a condition which expressly violates a requirement of Fourier theory) TW products of 100 or larger are required to give good accuracy in the approximate Fourier pair. (Author)

AD-292 752 Div. 15
(TISTM/RGR) OTS price $1.10

RAND Corp., Santa Monica, Calif.
SOME QUESTIONS CONCERNING DIFFERENCE APPROXIMATIONS TO PARTIAL DIFFERENTIAL EQUATIONS,
by Richard Bellman. Apr 62, 5p. 1 ref. (Memo. no. RM-3083-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Partial differential equation, Operators (Mathematics), Differential equations, Digital computers, Applied mathematics.

AD-292 753 Div. 15
(TISTM/RGR) OTS price $1.10

Mathematics Research Center, U. of Wisconsin, Madison.
THE LIFTING PROPERTY AND DIRECT SUMS,
by Robert Ryan. Nov 62, 7p. 4 refs. (MRC technical summary rept. no. 366)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Algebras, *Topology, Measure theory, Groups (Mathematics), Mapping.

AD-292 904 Div. 15
(TISTP/MAK) OTS price $1.10

Pisa U. (Italy).
RESEARCHES ON PSEUDOCONVEX AND PSEUDOCONCAVE COMPLEX SPACES.
Technical rept., 1 Nov 61-30 Nov 62,
by A. Andreotti. 30 Nov 62, 6p. 5 refs.
(Grant AF EOAR 62-35)
Unclassified report

DESCRIPTORS: *Research program administration, *Mathematics, *Topology, *Bibliography, Algebraic topology.

The theory of pseudoconcave space, the study of deformation of Stein manifolds, and the investigation of topological properties of Runge Pairs are presented. (Author)

AD-292 912 Div. 15
(TISTW/JEA) OTS price $4.60

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
COMMUTATIVE MACHINES,
by Richard Laing and Jesse B. Wright. Dec 62, 46p. incl. illus. 6 refs. (Rept. no. 03105-24-T)
(Contract Nonr-122421 and Grant DA-SIG-36-039-61-G4)
Unclassified report

DESCRIPTORS: *Measure theory, *Mathematical logic, Information theory, Combinatorial analysis, Machines, Automation, Mathematical predictions.

Certain commutative automata and their behavior are discussed. Characterizations of the class of machines under consideration are presented. Several associations are shown between this class of machines and a set of words, and a set of points. An association between a language for the set of words and the set of points is also shown. Some results about this language are presented, after which it is shown how machines can be constructed which realize the behavior expressed in this language. In conclusion, results and comments on the characteristics of commutative machines and their transition systems are given. (Author)

Division 15 - MATHEMATICS

AD-292 914 Div. 15, 30
(TISTP/MAK) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
BOUNDS FOR THE PRINCIPAL FREQUENCY OF NONUNIFORMLY LOADED STRINGS AND APPENDIX. A RESULT ON REARRANGEMENTS,
by Binyamin Schwarz and Alfred Lehman. Oct 62, 30p. 7 refs. (MRC technical summary rept. no. 341)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Oscillation, *Differential equations, *Number theory, Mathematics, Frequency, Measurement, Matrix algebra, Resonance, Harmonic oscillators.

Let n particles of different masses be mounted at equally spaced points along a string which in itself is weightless and of unit tension. The string is fixed at its endpoints. Given the set of masses, the principal frequency of this loaded string becomes minimal if the masses are arranged decreasing from the center in as nearly a symmetrical order as possible. The case corresponding to the loaded string free at one end and fixed at the other is also considered. (Author)

AD-292 915 Div. 15
(TISTP/MAK) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
LINEAR TRANSFORMATIONS OF A FUNCTIONAL INTEGRAL, II,
by Thomas I. Seidman. Oct 62, 20p. 3 refs. (MRC Technical summary rept. no. 346)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Topology, *Measure theory, *Transformations (Mathematics), *Integration.

It was proved in Seidman, T. I., Linear Transformations of a Functional Integral, I; Comm. Pure and Appl. Math., Vol. XII, No. 4 (1959), that the measure on the countable direct product of real lines with identical normally distributed measures, transforms (with a specified Radon-Nikodym derivative) to an equivalent (mutually absolutely continuous) measure under linear transformations of the form T = I + A with A a non-singular, Hilbert-Schmidt operator with finite trace (evaluated with respect to the canonical basis). We shall extend this result to transformations of the form T = U(I + A) where U is unitary and A non-singular and Hilbert-Schmidt but with no traceability condition imposed. (Author)

AD-292 916 Div. 15
(TISTM/RGR) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
ASYMPTOTIC POWER SERIES EXPANSIONS OF INTEGRALS INVOLVING A LARGE PARAMETER. PART II: ONE SINGULARITY CLOSE TO THE SADDLE POINT,
by John P. Ulrich. 1962, 22p. incl. illus. 8 refs. (MRC Technical summary rept. no. 348)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Taylor's series, *Integrals, Series, Mathematics.

The problem of a branch point or a pole close to a saddle point is considered. A convergent power series is developed for a particular class of integrals with one such singularity close to the saddle point and all other singularities far away. A set of necessary and sufficient conditions for the utility of this series is given and the series converges very rapidly if a particular parameter has large modulus. The special case for a first order pole is also given a separate treatment since the analysis can be made relatively simple for that case. The convergent series lead directly in all cases to more tractable semiconvergent ones although no presentation is made in the latter form. (Author)

AD-292 917 Div. 15
(TISTM/RGR) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
SOME ASPECTS OF FUNCTIONAL INTEGRATION,
by Thomas I. Seidman. Oct 62, 23p. 22 refs. (MRC Technical summary rept. no. 352)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Integration, *Functional analysis, Topology, Statistical processes, Functions, Mathematics.

This investigation compares and describes some of the relations between various theories of Gaussian integration over function space. (Author)

AD-292 918 Div. 15
(TISTM/RGR) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
MATRICES OF LINEAR OPERATORS,
by P. M. Anselone. Nov 62, 11p. 4 refs. (MRC Technical summary rept. no. 362)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Matrix algebra, *Operators (Mathematics), Algebras, Functional analysis, Series, Mathematics.

The classical Hamilton-Cayley theorem is extended as follows to matrices of operators on a Banach space B. Let $\mathbf{T} = [a_{ij} I + K_{ij}]$, i,j = 1,..., m, where the a_{ij} are scalars, I is the identity operator on B, and the K_{ij} are compact linear operators on B. Let P(lambda) be the characteristic polynomial of $[a_{ij}]$. Then P($\mathbf{T}$) represents a compact operator on the product space B-m. This theorem is applied to the study of the asymptotic behavior of a sequence of elements in B which satisfy a composite recursion formula. In addition, the theorem is generalized to an abstract algebraic setting. (Author)

AD-292 968 Div. 15
(TISTP/JW) OTS price $7.60

California U., Berkeley.
TOWARDS A GENERAL PROGRAM FOR THE NUMERICAL SOLUTION OF BOUNDARY VALUE PROBLEMS OF ORDINARY DIFFERENTIAL EQUATIONS,
by E. Close, R. DeVogelaere and others. Sep 62, 72p. incl. illus. (Technical rept. no. 62-3)
(Contract Nonr-22280, NR 944-249)
Unclassified report

DESCRIPTORS: *Differential equations, Operators (Mathematics), Functions, Harmonic analysis, Numerical analysis, Linear systems, Nonlinear systems, Mapping, Boundary layer.

LINOP I with its associated subprograms has been developed in an effort to provide an iterative procedure for solving a class of problems which admit the following description. Given a linear operator L, boundary conditions B which in principle may be non-linear, and a suitably well behaved function f(,) it is desired to find a parameter lambda and a function u defined on a given domain E such that the boundary conditions B are satisfied and Lu = lambda f(u,lambda). It is assumed that f, L, and B are such that a unique solution exists in some neighborhood containing E. In order that the program will have a wide range of application, an attempt has been made to isolate the properties that depend on the method used for the solution from those that are peculiar to the specific problem considered. For example, if the difference between two problems is the statement of the boundary conditions, then it might be that the only modifications necessary are in the subroutines dealing with the boundary conditions. (Author)

AD-292 980 Div. 15
(TISTW/JEA) OTS price $3.60

Hebrew U. (Israel).
ON THE MECHANIZATION OF THE THEORY OF NUMBERS,
by M. Machover and A. Robinson. Sep 62, 37p. 4 refs. (Technical rept. no. 9)
(Contract N62558-2214)
Unclassified report

DESCRIPTORS: *Numerical methods and procedures, *Number theory, Mathematical logic, Mathematical prediction, Distribution theory, Machines, Memory devices, Israel, Computers.

Research is presented on the infant science of theorem proving by machine, which in its turn belongs to the wider subject of artificial intelligence. Number theory is a natural candidate for mechanization and its consideration for this purpose has been suggested by several investigators. The present paper is written in the belief that ultimate success in this field is likely to be achieved only as a result of long and arduous work. The writers know from conversations that other researchers are considerably more optimistic in their assessment of the problem. (Author)

AD-292 997 Div. 15
(TISTP/TL) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
ASYMPTOTIC POWER SERIES EXPANSIONS OF INTEGRALS INVOLVING A LARGE PARAMETER. PART I. LARGE SEPARATION OF ALL SINGULARITIES FROM THE SADDLE POINT,
by John P. Ulrich. Oct 62, 31p. incl. illus. 9 refs. (MRC technical summary rept. 344)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Taylor's series, *Integrals, *Errors, *Functions, *Transformations (Mathematics).

A brief review of methods used to obtain asymptotic power series expansions for contour integrals involving a large parameter is presented and criticism of these methods is given. An approach is then developed which produces a convergent series with a bounded remainder (error) for a particular class of such functions. These functions depend upon three parameters; a set of conditions involving the relative ranges of these parameters is given which is necessary and sufficient to the remainder being acceptably small. The new development leans heavily on full utilization of the region about the saddle point in which the integrand is analytic. The usual semi-convergent asymptotic power series expansion is derived from the new results as a special case. (Author)

AD-293 211 Div. 15
(TISTP/MAK) OTS price $4.60

California U., Berkeley.
REFLECTION LAWS OF FOURTH ORDER ELLIPTIC DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT VARIABLES,
by Robert Dillon Brown. Dec 62, 40p. incl. illus. 8 refs. (Technical rept. no. 19)
(Contract Nonr-22262)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Real variables, *Mathematical analysis.

The analytic continuation of analytic solutions of a fourth order linear elliptic partial differential equation in two real variables with constant coefficients across an analytic boundary is considered. It is assumed that the principal part of the equation factors into four distinct (complex) linear factors and that a solution $u(x,y)$ is defined and analytic in a convex domain adjacent to an open segment of the x-axis on the side $y < 0$. (Author)

AD-293 212 Div. 15
(TISTP/MAK) OTS price $5.60

California U., Berkeley.
ON THE REFLECTION LAWS OF FOURTH ORDER ELLIPTIC DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT VARIABLES,
by R. D. Brown. Oct 62, 58p. incl. illus. 7 refs. (Technical rept. no. 18)
(Contract Nonr-22262)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Real variables, *Mathematical analysis.

A study is made of the analytic continuation of solutions of elliptic partial differential equations in two independent variables across an analytic boundary on which they satisfy further analytic equations connecting the point of the boundary and the values of the solution and of various of its partial derivatives. In this report a general type of fourth order elliptic equation with constant coefficients is considered. (Author)

AD-293 215 Div. 15
(TISTP/GRW) OTS price $6.60

California U., Berkeley.
FINITE ASYMPTOTIC EXPANSIONS OF SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS,
by Neil M. Wigley. Dec 62, 60p. 9 refs. (Technical rept. no. 20)
(Contract Nonr-22262)
Unclassified report

Division 15 - MATHEMATICS

DESCRIPTORS: *Partial differential equations, *Series, Green's function, Integrals.

Let u(x,y) be a solution in a domain D of the partial differential equation $\Delta u + ku = f$. Suppose that part of the boundary of D consists of two analytic arcs which meet at the origin and form there an interior angle $\pi\alpha > 0$. If on each of the analytic arcs u(x,y) satisfies a linear boundary condition of order 0 or 1, and if all the data are $\mathcal{E}^N$, then u has an asymptotic expansion in powers of z, $\bar{z}$, $z^{1/\alpha}$, $\bar{z}^{1/\alpha}$, log z, and log $\bar{z}$, with an error term approximately of order z^N. Furthermore this expansion may be formally differentiated N times. (Author)

AD-293 242 Div. 15,6
(TISTW/JEA) OTS price $4.60

System Development Corp., Santa Monica, Calif.
ON TRANSPORTATION OF COORDINATES IN RADAR DATA INPUT SYSTEMS,
by Richard D. Barrar and Richard C. Kao.
22 Dec 58, 43p. incl. illus. tables, 3 refs.
(Rept. no. SP-60)
Unclassified report

DESCRIPTORS: *Differential geometry, *Numerical analysis, *Transformations (Mathematics), Special functions, Mapping, Radar equipment, High altitude, Map projection, Earth, Spheres, Target angle, Errors, Radar plotting.

Contents:
Stereographic projection
Mapping equations for spherical earth
Linear and quadratic approximations
Derivation of co-ordinates of projected points (appendix)
On height in radar data (appendix)

AD-293 244 Div. 15
(TISTM/ODN) OTS price $1.10

System Development Corp., Santa Monica, Calif.
ON A NEW FUNCTIONAL TRANSFORM IN ANALYSIS: THE MAXIMUM TRANSFORM,
by Richard M. Bellman and W. Karush. 21 June 61, 7p. 3 refs. (Rept. no. SP-370)
Unclassified report

DESCRIPTORS: *Mathematics, *Operators (Mathematics), Mathematical analysis, Functions, Integral transforms, Theory.

AD-293 245 Div. 15
(TISTE/PAR) OTS price $1.60

System Development Corp., Santa Monica, Calif.
THE UTILITY OF STATISTICS OF RANDOM NUMBERS,
by Charles E. Clark. 24 June 59, 19p. incl. tables, 5 refs. (Rept. no. SP-79)
Unclassified report

DESCRIPTORS: *Numerical methods and procedures, *Statistical distributions, *Statistical analysis, Tables, Probability, Statistical functions, Statistical tests, Sampling.

The utility of tables of random numbers is enhanced when statistics of the numbers are known. Such statistics permit, inter alia, the efficiencies of stratified sampling. This fact is indicated by numerical examples. (Author)

AD-293 456 Div. 15
(TISTP/MAK) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
AN INVERSION INTEGRAL FOR A GEGENBAUER TRANSFORMATION,
by Theodore P. Higgins. Oct 62, 13p. 3 refs.
(Mathematical note no. 274; Document no. D1-82-0206)
Unclassified report

Also available from the author.

DESCRIPTORS: *Integral transforms, *Transformations (Mathematics), *Integrals, *Polynomials.

Ta Li, a new class of integral transforms, obtained an integral inversion formula for an integral transformation where the kernel involved a Chebyshev polynomial of the first kind, and more recently Buschman obtained the integral inversion formula for a similar integral transformation where the kernel is a Legendre polynomial. An integral inversion formula is established for an integral transformation which contains the Gegenbauer polynomial in the kernel. The transforms obtained by Li and Buschman are both special cases of this transform pair. The general integral equation given here can always be inverted by an integral which involves Legendre polynomials or by one which involves Chebyshev polynomials. (Author)

AD-293 674 Div. 15
(TISTP/MAK) OTS price $2.60

RAND Corp., Santa Monica, Calif.
UPPER BOUNDS, SECONDARY CONSTRAINTS, AND BLOCK TRIANGULARITY IN LINEAR PROGRAMMING,
by George B. Dantzig. 4 Oct 54, 21p. 9 refs.
(Rept. no. P-576)
Unclassified report

DESCRIPTORS: *Linear programming, *Matrix algebra, *Numerical methods and procedures.

Short cut computational methods are developed for solving systems whose matrices may be generally described as block triangular. (Author)

AD-293 675 Div. 15
(TISTP/JW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE CIRCULAR COVERAGE FUNCTION,
by H. H. Germond. 26 Jan 50, 16p. incl. tables.
(Rept. no. RM-330)
Unclassified report

DESCRIPTORS: *Probability, *Tables, Statistical functions.

The integral of the circular Gaussian distribution (1/2 pi)exp(-rho square/2) over a circle of radius R with center at a distance r from the origin will be designated as p(R,r). This integral is the probability that a missile will hit a circle of radius R if it is aimed at a point a distance r from the center of the circle and if it is subject to a Gaussian impact-probability law of unit standard deviation. It is also the probability that a circular disk of radius R will cover a point at a distance r from the point of aim, if the probable position of the disk is described by a Gaussian distribution of unit standard deviation. To state it another way, it is the probability that a missile aimed at some point a distance r from a given point will hit within a distance R of that given point, if the

missile is subject to a circular Gaussian distribution law of unit standard deviation. It is proposed to refer to this integral as the circular coverage function. (Author)

AD-293 676 Div. 15
(TISTP/MAK) OTS price $1.60

RAND Corp., Santa Monica, Calif.
SOME STATISTICAL PROBLEMS CONNECTED WITH STOCHASTIC PROCESSES,
by T. W. Anderson and D. A. Darling. 11 Nov 49, 12p. (Rept. no. RM-284)
Unclassified report

DESCRIPTORS: *Statistical tests, *Statistical analysis.

The statistical problem treated here is that of testing the hypothesis that a sample of n independent, identically distributed random variables have the common continuous distribution function F(x), specified in advance. In principle this will give confidence regions for the unknown distribution function, for if we have a test (based on the n observations) for every F(x), the confidence region will consist of precisely those F(x) for which the corresponding hypotheses are not rejected. For large n certain asymptotic tests are developed which were envisaged by Kolmogoroff, Smirnov, Cramer, and von Mises. The method used here is to reduce the problems down to more or less straightforward considerations in the theory of continuous Gaussian stochastic processes- a reduction developed by Doob, and used by him to give a simplified proof of Kolmogoroff's fundamental result. This note considers somewhat more refined questions which may be of interest to statisticians. (Author)

AD-293 677 Div. 15, 31
(TISTP/MAK) OTS price $5.60

RAND Corp., Santa Monica, Calif.
STUDIES ON BOTTLENECK PROBLEMS IN PRODUCTION PROCESSES,
by Richard Bellman and R. Sherman Lehman. 25 Feb 54, 48p. incl. illus. 2 refs. (Rept. no. P-492)
Unclassified report

DESCRIPTORS: *Programming, *Production, *Industrial production, *Games theory, Differential equations, Integral equations, Simultaneous equations, Matrix algebra, Manufacturing methods, Statistical analysis.

Two papers are given, their purpose being to study in detail some representative problems which occur in the study of interindustry processes. The general techniques will be those of the theory of dynamic programming. The first paper considers a simple mathematical model of the interaction of two independent industries engaged in the production of one item. For convenience, the auto and steel industries are considered. The second paper treats the problem of maximizing x sub 2 (T) given the equations: dx sub 2/dt = a sub 2 z sub 2 (t) - z sub 3 (t), x sub 2 (0)<c sub 2, and dx sub 3/dt = b sub 3 gamma sub 3 z sub 3 (t) gamma sub 2 a sub 2 (t), x sub 3 (0) c sub 3, and the constraints: z sub 2, z sub 3 greater than or equal to 0, z sub 2 + z sub 3 less than or equal to x sub 2, and gamma sub 2 z sub 2+ gamma sub 3 z sub 3 less than or equal to x sub 3, where a sub 2, b sub 2, gamma sub 2, and gamma sub 3 are positive constants.

AD-293 678 Div. 15
(TISTP/MAK) OTS price $3.60

RAND Corp., Santa Monica, Calif.
SOME FUNCTIONAL EQUATIONS IN THE THEORY OF DYNAMIC PROGRAMMING. I. FUNCTIONS OF POINTS AND POINT TRANSFORMATIONS,
by R. Bellman. 15 Sep 54, 34p. 20 refs. (Rept. no. P-566)
Unclassified report

DESCRIPTORS: *Theory, *Functional analysis, Dynamic programming, Games theory, Calculus of variations, Transformations (Mathematics), Sequences, Operators (Mathematics), Statistical analysis, Simultaneous equations, Statistical processes, Mathematics.

A number of basic results concerning the solutions of a large and important class of functional equations which arise in the theory of dynamic programming are established. Only functions of points and point transformations are considered here. In a subsequent report we shall treat more general equations involving functionals and operators. Let p denote a vector representing a point in an N-dimensional region D, and T(p, q), for all vectors q in some prescribed M-dimensional set S, which may consist of a finite number of points, an enumerably infinite set, or which may consist of a finite number of points, an enumerably infinite set, or which may be a continuum, denote a transformed point lying in D for each p in D. Let f(p) denote a scalar function of p and g(p, q) and h(p, q) be two scalar functions of p and q. A representative example of functional equations we shall discuss is f(p) = Sup (g(p, q) + h(p, q)f(T(p, q)) . This is an analytic equivalent of the principle of optimality for multi-stage decision processes. Apart from their interest in connection with multi-stage decision processes, these equations possess the merit of constituting in many ways a natural extension of linear equations. (Author)

AD-293 679 Div. 15
(TISTP/MAK) OTS price $2.60

RAND Corp., Santa Monica, Calif.
SOME APPLICATIONS OF THE THEORY OF DYNAMIC PROGRAMMING - A REVIEW,
by Richard Bellman. Rev. 14 May 54, 23p. incl. illus. 22 refs. (Rept. no. P-490)
Unclassified report

DESCRIPTORS: *Bibliography, *Programming, *Theory, *Games theory, Statistical analysis, Simultaneous equations, Sequences, Statistical processes, Production, Manufacturing methods, Industrial production.

An expository account of the theory of dynamic programming is provided. Two problems of rather simple form are considered: (1) (Optimal Allocation). We are given a resource, x, to divide into two parts, y and x-y. From y we obtain a return of g(y); from x-y a return of h(x-y). In so doing, we expend a certain amount of the original quantity and are left with a new quantity, ay + b(x-y), where 0 < a, b < 1. This process is now continued. The problem is to allocate at each stage so as to maximize the total return obtained over a finite or unbounded number of stages. (2) (Efficient Gold Mining). We are fortunate enough to possess two gold mines, Anaconda and Bonanza, the first of which contains an amount x of gold, while the second possesses an amount y. In addition, we have a rather delicate gold-mining machine which has the property that if used to mine gold in Anaconda, there is a probability p sub 1 that it will mine a fraction r sub 1 of the gold there

and remain in working order, and a probability (1-p sub 1) that it will mine no gold and be damaged beyond repair. Similarly, Bonanza has associated the probabilities p sub 2 and (1-p sub 2) and the fraction r sub 2. (Author)

16. MEDICAL SCIENCES

AD-291 905 Div. 16
(TISTB/MD) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
METABOLISM OF CREOSOTE BY CERTAIN MARINE MICROORGANISMS,
by R. W. Drisko, T. B. O'Neill, and H. Hochman.
14 Dec 62, 21p. incl. tables, 9 refs. (Technical rept. no. R 230)
Unclassified report

DESCRIPTORS: *Creosote, *Preservation, Chromatographic analysis, Marine borers, Naphthalenes, Phenanthrenes, Pseudomonas, Toxicity, Bacteria, Metabolism, Wood.

Laboratory experiments showed that microorganisms present on creosoted piling in Port Hueneme harbor were found to have the ability to metabolize creosote, causing loss of creosote and producing chemical changes similar to those which occur naturally in creosote exposed in a submerged harbor environment. This metabolism appears to be restricted to the aromatic hydrocarbon components. Two of these, naphthalene and phenanthrene, were shown to be metabolized to a significant extent by certain marine microorganisms. (Author)

AD-291 910 Div. 16, 28
(TISTB/MD) OTS price $2.60

Aerospace Information Div., Washington, D. C.
PRINCIPLES OF LIFE SUPPORT IN SPACE. BASED ON SOVIET OPEN LITERATURE PUBLISHED IN CONNECTION WITH THE VOSTOK-3 AND VOSTOK-4 LAUNCHINGS.
5 Dec 62, 27p. incl. table, 70 refs. (AID rept. no. 62-194)
Unclassified report

DESCRIPTORS: *Space flight, *Space medicine, Telemeter systems, Weightlessness, Sleep, Astronautics, Space capsules, Spaceship cabins, Space environmental conditions, Spaceships, Safety, Safety devices, Food, Communication systems, Automatic navigators, Adjustment (Psychology), Pilots, Scientific personnel, Newspapers, Analysis, Physiology, Ear, Training, Electronic circuits, USSR.

Descriptions of the principles of life support in space used by Soviet specialists at the present time for orbital flights, and those which are being discussed and developed for future long-range missions have been extracted from more than two hundred articles and TASS reports published predominantly in Soviet newspapers in connection with the launching of the Vostok-3 and Vostok-4 spaceships. The articles were written by various specialists in the field of space technology, including academicians, corresponding members of the Academy of Sciences, professors, doctors of biological sciences, doctors of medical sciences, candidates of medical and technical sciences and physics and mathematics, engineers, science reporters, and cosmonauts. Primary emphasis was placed on discussions of data which describe the design elements of equipment used in space applications, including the spaceship cabin, automatic devices, equipment used in the cosmonaut training program. Psychological and physiological conditioning and responses and safety factors are included. (Author)

AD-291 911 Div. 16
(TISTB/MD) OTS price $2.60

Aerospace Information Div., Washington, D. C.
SOVIET MANNED SPACE FLIGHT LIFE SUPPORT SYSTEMS: MEDICAL AND BIOLOGICAL ASPECTS OF THE VOSTOK-3 AND VOSTOK-4 FLIGHTS.
Nov 62, 25p. incl. illus. 37 refs. (AID rept. no. 62-191)
Unclassified report

DESCRIPTORS: *Space flight, *Astronautics, Preparation, Orbital flight paths, Communication systems, Radio communication systems, Television communication systems, Food, Training, Physical fitness, Man, Weightlessness, Space medicine, Bibliography, Spaceship cabins, Psychology, Telemeter systems, Physiology, Stress (Physiology), Stress (Psychology), Dosimeters, Radiation effects, Closed-cycle ecological systems, Hypothermia, Pilots, USSR.

The medical and biological aspects of the Vostok-3 and Vostok-4 flight, including selection of orbits, physical and psychological preparation, medical monitoring, radiation protection, diet, cabin ecology, and projected problems for interplanetary flight, were reviewed. The sources are from Soviet open-literature, chiefly newspapers, published in the period August-October, 1962.

AD-291 949 Div. 16
(TISTB/MD) OTS price $1.60

Jewish Hospital, St. Louis, Mo.
THERAPEUTIC PROPERTIES OF BLOOD PLASMA IN THE THERAPY OF TOURNIQUET SHOCK.
Progress rept., 1 Jan-31 Dec 62,
by Morton D. Pareira. 26 Dec 62, 15p. incl. illus. 3 refs.
(Contract DA 49-007-md-799)
Unclassified report

DESCRIPTORS: *Traumatic shock, *Blood plasma, Rats, Man, Serum albumin, Aging, Antibiotics, Decontamination, Freezing, Electrophoresis, Fractionation, Porous filters, Therapy.

A convenient method for the sterile preparation of plasma (or other body fluids from small animals using a millipore filter system is described. Aged rat plasma is no more effective in the therapy of rat tourniquet trauma than freshly collected rat plasma. Frozen rat plasma seems to be also as effective as freshly collected plasma. None of the rat plasma preparations are as effective as aged or lyophilized human plasma. Recently collected single donor or pooled human plasma allows no survival when infused after the standard rat tourniquet trauma. Shelf-stored, pooled human plasma (6 months at room temperature) is as effective as reconstituted lyophilized human plasma (highly effective) in the therapy of this trauma. At the time significant protection is first achieved, electrophoretic studies show the appearance of a band not present in the fresh material. This band is also present in the lyophilized reconstituted plasma. Reconstituted human plasma is significantly more effective in the therapy of rat tourniquet trauma than human albumin when both are adjusted to the same total protein concentration. This observation questions whether the resuscitative effect of the human plasma is due to its oncotic effect only or to some property of the plasma present in the non albumin fraction. (Author)

AD-292 003 Div. 16
(TISTB/MD) OTS price $1.10

Charleston Coll., S. C.
TRANSFORMATION OF CAROTENOIDS BY MARINE BACTERIA AND PROTEOLYTIC ACTIVITY OF MARINE BACTERIA.
Final rept., Oct 57-Sep 62,
by Joseph R. Merkel and Norman A. Chamberlain.
Dec 62, 5p. 5 refs.
(Contract Nonr-243901)
Unclassified report

DESCRIPTORS: *Carotenoids, *Bacteria, Chlorophylls, Wood, Metabolism, Marine borers, Marine biology, Algae, Separation, Sea water, Amino acids, Oxidation, Proteases.

AD-292 068 Div. 16
(TISTB/MS) OTS price $13.50

RAND Corp., Santa Monica, Calif.
REACTIONS OF HEMOGLOBIN AND STEADY STATES IN THE HUMAN RESPIRATORY SYSTEM: AN INVESTIGATION USING MATHEMATICAL MODELS AND AN ELECTRONIC COMPUTER,
by James C. DeHaven and Edward C. DeLand.
Dec 62, 186p. incl. illus. tables, 47 refs.
(Research memo. no. RM-3212-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Hemoglobin, *Mathematical analysis, *Respiratory system, *Blood, Biochemistry, Data, Physiology, Computers.

Using thermodynamic principles relating to steady-state processes, a detailed biophysicochemical model of the human external respiratory subsystem was constructed. Mathematical experiments performed with this model give good agreement with reported physiological data relating to the functioning of this subsystem under normal and some abnormal conditions. The model was applied to the representation of the exchanges of respiratory gases and related chemical phenomena occurring between the venous and arterial sides of the total air-blood system. In addition, the model was used to explore the quantitative as well as the qualitative significance of biochemical functions that are believed to be important in establishing the characteristics of the system. These functions include the Bohr effects of hemoglobin and various hypotheses of carbamino formation, as well as the dynamic steady-state gradients imposed by the erythrocyte metabolic pump and the disparate concentrations of nondiffusible species operating across the cell membranes. (Author)

AD-292 074 Div. 16
(TISTB/MD) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
SPLEEN COLONY FORMATION AND HEMOPOIETIC RESTORATION IN LETHALLY X-IRRADIATED MICE AFTER INJECTION OF ISOGENIC PERITONEAL CELLS,
by L. J. Cole. 13 Nov 62, 12p. incl. tables, 13 refs. (Rept. no. NRDL-TR-597)
Unclassified report

DESCRIPTORS: *Radiation effects, *Transplantation, Survival, Mice, X rays, Body fluids, Blood, Reticulo-endothelial system, Thymus gland, Bone marrow, Hemopoiesis, Therapy, Tissues (Biology).

The capacity of intravenously injected cells from peritoneal fluid, peripheral blood, lymph nodes, thymus and bone marrow of mice to restore hematopoiesis in lethally X-irradiated (880 rad) isogenic recipients, was investigated. Thirty-day survival, and visible colony formation in the spleen were employed as the criteria. Administration of 6 million or 11 million peritoneal cells, and 6,400,000 or 15 million peripheral leukocytes afforded protection against mortality, and elicited colonies in the spleen; comparable effects were observed after injection of 110,000 marrow cells. The injection of 34 million adult lymph node cells or of 9 million thymus cells from newborn mice had no effect on mortality, nor did they elicit spleen colony formation. A correlation appears to exist between the capacity of isogenic cells to restore hemopoiesis in lethally irradiated mice and their ability to elicit visible colony formation in the spleen. The evidence suggests that normal peritoneal cell populations and peripheral blood leukocytes contain hemopoietic stem-cell elements, with a frequency 30 to 50 times lower than among bone marrow cells. No evidence was adduced to support the concept that normal lymphoid tissue lymphocytes give rise to hemopoietic cell lines. (Author)

AD-292 077 Div. 16, 12, 20
(TISTA/GEC) OTS price $3.60

RAND Corp., Santa Monica, Calif.
GALACTIC COSMIC RADIATION AND MANNED SPACE FLIGHT,
by A. R. Tamplin and H. K. Fisher. Dec 62, 28p. incl. illus. tables, 20 refs. (Memo. no. RM-3043-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Space flight, Manned, Radiation effects, Galaxies, Dosage, Theory, Radiation injuries, Physiology, Mathematical prediction, Particles, Space medicine, Nerves, Radiobiology, Neurology, Hazards, Cosmic rays.

A discussion of the flux and composition of primary cosmic particles of galactic origin is presented, together with a discussion of the processes through which these particles may transfer energy to biological specimens. The biological effects of primary cosmic particles are estimated on the bases of both dosage and pseudo-target theory. The dosage was estimated according to the method of Tobias wherein it is assumed that all particles that enter the body are stopped within the body without undergoing nuclear collision and fragmentation. As such, this estimate is an upper limit for the dosage and corresponds to 0.07 rem/day. The pseudo-target-theory approach was based upon the consensus of radiobologists that the only significant biological effect of primary cosmic particles will be injury to the neurons of the nervous system, since these neurons cannot be replaced. Using assumed values of kill cross sections and the measured flux of primary cosmic particles, it was possible to estimate that the fraction of neurons that might be killed as a function of exposure time is on the order of 1% in 100 days. (Author)

AD-292 123 Div. 16
(TISTB/MD) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
LATE EFFECTS OF FRACTIONATED X RADIATION IN MICE-FAILURE TO PREVENT NON-THYMIC LYMPHOMAS BY THIGH-SHIELDING,
by L. J. Cole and P. C. Nowell. 4 Nov 62, 16p. incl. illus. tables, 21 refs.
(Rept. no. NRDL-TR-595)
Unclassified report

DESCRIPTORS: *Radiation effects, X-rays, Shielding, Mice, Survival, Leukemia, Cancer.

Groups of female LAF1 mice were exposed to an X-ray dose of 260 rads given in a single dose (at 11 weeks or 14 months of age) or in 52 weekly doses of 5 rads each (started at 11 weeks of age). A group of the latter animals had one thigh shielded during the irradiation procedure. The incidence of malignant lymphoma, of the generalized nonthymic type, was increased in both of the groups receiving fractionated doses of radiation; thigh shielding did not inhibit leukemogenesis under these conditions. This finding suggests that the mechanisms of radiation induction of thymic and nonthymic lymphomas in mice may differ, since in the former case, shielding of hematopoietic cells reduces lymphoma incidence. Median life span did not differ significantly among the 3 groups of mice irradiated at 11 weeks of age. The median life span for the mice receiving a single dose of 260 rad at 14 months of age (i.e., 28 months) was 5 months longer than that of the group receiving a single dose of 260 rad at 11 weeks of age. (Author)

AD-292 205 Div. 16
(TISTB/MD) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHYSIOLOGICAL JOURNAL (SELECTED ARTICLES).
14 Nov 62, 20p. incl. illus. refs. (Trans. no. FTD-TT-62-1361 fron Fiziologichniy Zhurnal 8:3, pp. 382-396, June 62)
Unclassified report

DESCRIPTORS: *Electromagnetic effects, *Superhigh frequency, Absorption, Laboratory animals, Burns, Body temperature, Resonance absorption, Mice, Heat production (Biology), Heating, Reproductive system, Testes, Pathology, Histology, Tissues (Biology), Microwaves.

Contents:
Investigating local thermal effect of electromagnetic 3-cm waves on animals
Morphological changes in internal organs when the organism is exposed to the effect of centimeter waves.

AD-292 213 Div. 16
(TISTB/MD) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DIBAZOL IN THE PREVENTION AND THERAPY OF TOXEMIA OF LATE PREGNANCY (SELECTED PARTS),
by Elizabeta Borisovna Derankova. 16 Nov 62, 63p. incl. illus. tables (Trans. no. FTD-TT-62-1302 from Dibazol v Profilaktike i Lechenii Pozdinkh, Library of Practical Medicine, Leningrad, (Chap. III & IV) pp. 34-100, 1961)
Unclassified report

DESCRIPTORS: *Vasomotor drugs, *Hypertension, Kidneys, Rabbits, Blood pressure, Blood vessels, Dilation, Uterus, Muscle relaxants, Pregnancy, Pathology, Diuretics, Edema, Pharmacology, Therapy.

Contents:
Pharmacological characteristics of dibazol
Clinical use of dibazol in toxemias of late pregnancy

AD-292 227 Div. 16
(TISTB/CCH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
WEIGHTLESSNESS,
by N. N. Gurobskiy and M. A. Gerd. 30 Oct 62, 14p. incl. illus. (Trans. no. FTD-TT-62-1310 from Nauka i Zhizn', no. 11, pp. 86-91, 1961)
Unclassified report

DESCRIPTORS: *Weightlessness, *Space medicine, Electric potential, Water, Pilots, Muscles, Cardiac muscle, USSR, Man.

AD-292 232 Div. 16, 20
(TISTB/CCH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BULLETIN OF EXPERIMENTAL MEDICINE AND BIOLOGY (SELECTED ARTICLES).
13 Nov 62, 17p. incl. illus. table, refs. (Trans. no. FTD-TT-62-823 from Byulleten' Eksperimental'noy Biologii i Meditsiny, 53:4, pp. 38-46, 1962)
Unclassified report

DESCRIPTORS: *Periodicals, *Radiobiology, *Radiation injuries, Blood forming organs, Respiration, X rays, Acceleration, Anoxia.

Contents:
Disturbance in the reactions of the hematopoietic system at late postirradiation periods
The effect of oxygen deficiency and prolonged radial accelerations the organisms of animals

AD-292 261 Div. 16
(TISTB/CCH) OTS price $1.60

Tokyo Metropolitan Ebara Infectious Disease Hospital (Japan).
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS).
Rept. no. 1 (Final), 1 Oct 61-30 Sep 62, by Yasuzo Nakamizo. 30 Sep 62, 11p. incl. illus. tables, 4 refs.
(Contract DA 92-557-FEC-35580)
Unclassified report

DESCRIPTORS: *Infections, *Mucous membranes, Shigella, Salmonella, Escherichia, Virus diseases, Intestine.

Serological study on the serum and rectal mucus aspirated almost purely from the rectal cavity of patients with Shigellosis and with Salmonellosis using a romanoscope was conducted. The agglutinin titers of the serum and mucus in patients with bacillary dysentery reached peak mostly in the second or third week of illness, but in a few cases within the first week. Judging from the agglutinin and hem-agglutinin values, the mucus antibody turned out to be suggestive of its closer association with the excretion of Shigella bacilli than the serum antibody. Comparative studies of the agglutination test, the hem-agglutination test and the Latex agglutination test showed that the hem-agglutinin titer and the Latex agglutinin titer were higher than the agglutinin titer, and the hem-agglutinin titer was almost similar to the Latex agglutinin titer, with exceptions in a few cases. Widal test using the Latex antigen consisting of a mixture of Latex suspension and Widal antigen showed the agglutinin titer to be higher than those in the routine Widal test. The Latex agglutination test offers the ad-

vantage of yielding exact, readable results within two hours over both the agglutination test and the hem-agglutination test in which reading can be made only after twenty-four hours. (Author)

AD-292 262 Div. 16
(TISTB/MD) OTS price $4.60

Hiroshima U. School of Medicine (Japan).
TO STUDY IN THE DOG THE LOCALIZATION OF THE MOTOR AREAS IN THE HYPOTHALAMUS AND THEIR CONNECTION VIA THE MEDULLA AND SPINAL CORD FOR THE PRODUCTION OF EXCITATORY AND INHIBITORY EFFECTS ON THE STOMACH AND BLOOD PRESSURE.
Rept. no. 1 (Final), 15 Oct 61-14 Oct 62, by Takehiko Semba. 14 Oct 62, 41p. incl. illus. tables, 17 refs.
(Contract DA 92-557-FEC-35616)
Unclassified report

DESCRIPTORS: *Hypothalamus, *Blood pressure, Histology, Histological sections, Respiration, Stomach, Constriction, Heart, Electrical effects, Dogs, Stimulation.

The pressor and depressor effects and its localizations were investigated physiologically and histologically on the dog's cerebral peduncle and its rostral part until the hypothalamus. The remarkable pressor and depressor effects which produced the changes on the systemic blood pressure more than 30 mm Hg were observed on 116 dogs. The changes of heart rate and respiration, which were followed to the pressor and depressor effects, were examined. 77 pressor areas and 69 depressor areas were determined on the histological examination. 64.9% of 77 pressor areas was located in the peduncle region. In the rostral part of it, the pressor areas were found in 12.9% (between peduncle and n.oculomotori), 15.6% (region of n.oculomotori), 0%(mamillary region), and 3.9% (hypothalamus region). 40.6% of 69 depressor areas was located in the peduncle and 11.6% was in the region between the peduncle and n.oculomotori. 20.3% was in the region of n.oculomotori. 13.0% was in mamillary region, 14.5% was in the region of hypothalamus. Both pressor and depressor areas in the region of peduncle, were located in Nucleus reticularis pontis oralis (Formatio reticularis) and Nucleus cuneiformis. (Author)

AD-292 263 Div. 16
(TISTB/CCH) OTS price $2.60

Osaka U. Medical School (Japan).
ON THE DEFENCE MECHANISMS AGAINST INFECTION.
Rept. no. 1 (Final), 1 Dec 61-31 Oct 62, by Tsunehisa Amano. 31 Oct 62, 20p. incl. illus. table, 12 refs.
(Contract DA 92-557-FEC-35672)
Unclassified report

DESCRIPTORS: *Antibodies, *Infections, *Immunology, *Leukocytes, *Staphylococcus, *Bactericides, Glutamine, Antigens, Glutaminases, Bacteriostatic substances, Purification, Theory.

Further purification studies were made of leucozyme C, A alpha and A beta of guinea pig leucocytes and the studies of their natures were continued. The complete separation of leucozyme from lysozyme was achieved and this preparation had no effect on the mucopeptide. Leucozyme A beta stops oxygen uptake and causes cytoplasmic destruction of nonpathogenic staphylococci. Of rabbit leucocytes, the acetic acid extract was active only for avirulent, but the HCl extract was active for avirulent and virulent pneumococci. Of guinea pig macrophages, the acetic acid extract of lyophilized cells was active for E. coli. Of rabbit macrophages, the neutral extract was active for E. coli and and avirulent strains of pneumococci. Antistaphylococcal substance found in guinea pig and bovine spleens and livers was differentiated from normal staphylococcal agglutinins. It is only bacteriostatic for actively growing cells. The role of gamma-glutamylase in passive protection of mice was examined administering with hyperimmune therapeutic sera (horse) and no protection was demonstrated. The attack point of plakin on the chain of respiratory system of B. megaterium was clarified. The electron transfer from flavoproteins to the cytochrome system was blocked. Phospholipids of cytoplasmic membrane were the main attack point of plakin and it was the cause of the damage of the electron transferring system. (Author)

AD-292 267 Div. 16
(TISTB/CCH) OTS price $2.60

Nara Medical Coll. (Japan).
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG.
Rept. no. 2 (Final), 13 Nov 61-12 Nov 62, by Yutaka Onji. 12 Nov 62, 5p. illus. table, 6 refs.
(Contract DA 92-557-FEC-35698)
Unclassified report

DESCRIPTORS: *Artificial respiration, *Amputees, *Surgery, Metabolism, Legs, Blood vessels.

Experimental surgery was performed on dogs to unite the completely amputated leg after artificial perfusion. It was found that the incidence of successful reunion decreased as the amputated period was prolonged. No reunion was possible if the amputated period exceeded 2 hours. Histological changes in muscle fibers developed 2 hours after amputation. Oxygen consumption was kept at nearly control level in legs without circulation for 4 hours. (Author)

AD-292 305 Div. 16
(TISTB/LMH) OTS price $1.10

Wayne State U. Coll. of Medicine, Detroit, Mich.
FERMENTATION OF CARBON 14-LABELED GLUCOSE BY CLOSTRIDIUM SPOROGENES.
Annual progress rept., 1 July-31 Dec 62, by Lida Mattman. 31 Dec 62, 5p. incl. tables.
(Contract DA 49-193-md-2268)
Unclassified report

DESCRIPTORS: *Glucose, *Clostridium perfringens, Carbohydrates, Culture media, Anaerobic spores, Pathology, Biochemistry, Healing, Metabolism, Growth.

This study was made to clarify the relationship between Clostridium sporogenes and the pathogenic Clostridia, particularly Clostridium perfringens. Preliminary experiments were conducted to: (1) develop a chemically defined medium which will support maximum growth with minimal sporulation of Clostridium sporogenes; (2) provide anaerobic conditions suitable for both C. sporogenes and Clostridium perfringens by use of an anaerobic incubator utilizing nitrogen supplemented with other gases; and (3) test effects of C. sporogenes filtrates upon growth and sporulation of C. perfringens. Several good synthetic media are used. The cultivation of C. sporogenes was found to be more difficult in the anaerobic

incubator utilizing 95% Nitrogen and 5% carbon dioxide than was the cultivation of C. perfringens. Filtrates of C. sporogenes may be providing protein-split products for utilization by C. perfringens. (Author)

AD-292 347 Div. 16
(TISTB/MD) OTS price $4.60

Massachusetts Inst. of Tech., Cambridge.
PROTEIN REQUIREMENTS AS A FUNCTION OF CALORIE INTAKE AND WORK LOAD.
Progress rept., 1 Apr-31 Oct 62,
by Donald M. Watkin. 31 Oct 62, 24p. tables, 14 refs.
(Contract DA 49-193-md-2264)
Unclassified report

DESCRIPTORS: *Diet, *Protein, Protein solutions, Man, Exercise, Biochemistry, Analysis, Body weight, Hemoglobin, Electrolytes (Physiology), Blood proteins, Creatinine, Excretion, Uric acid, Nutrition.

The interactions between dietary protein level and the daily performance of strenuous work were investigated. Liquid diets contained 1.2 (MITMEAL I) or 0.4 (MITMEAL II) g protein/kg body weight/day and 35 Cal/kg/day. Within subjects on both diets, the rate of weight loss during work was slightly higher than control. Decrements in skinfold thickness were proportional to weight changes. Nitrogen balances were positive during both control and work phases on diet I but negative on diet II. Inter-group comparisons between control and work subjects during the work phase revealed greater weight loss and decrement in skinfold thickness among work subjects on both diets. Nitrogen retention was greater among work subjects on diet I; losses were greater among work subjects on diet II. Total O2 consumption, R.Q., mechanical efficiency, blood chemistries, pulse and respiratory rates were uninfluenced by the protein level of the diet. These studies suggest that under these experimental conditions a dietary protein level between 0.8 and 1.0 g/kg/day is required for nitrogen equilibrium and between 1.0 and 1.4 g/kg/day if retention of 1 g/subject/day is to be attained. (Author)

AD-292 610 Div. 16
(TISTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BIOCURRENTS FROM A TAPE RECORDER,
by V. Mikhal'chenko and S. Tsikora. 30 Oct 62, 6p. (Trans. no. FTD-TT-62-1553 from Sovetskaya Molodezh', col. 1-4, No. 139, p. 4, 17 July 1962)
Unclassified report

DESCRIPTORS: *Electric currents, *Physiology, Recording systems, Medical equipment, USSR, Neuromuscular transmission, Stimulation, Biology, Electrical properties.

AD-292 637 Div. 16
(TISTB/CCH) OTS price $3.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
THE INFLUENCE OF DIET ON VOLUME AND MAJOR MOLECULAR COMPOSITION OF GASTROINTESTINAL GAS IN RATS.
Interim rept. for Nov 62,
by L. A. Whitehair and K. K. Matsumura. Nov 62, 31p. incl. illus. tables (AMXFC rept. no. 38-62)
Unclassified report

DESCRIPTORS: *Diet, *Digestive system, Gases, Biochemistry, Laboratory animals.

The volumes and major molecular composition of gastrointestinal gas produced in rats fed various diets were determined. Intestinal gas volumes and composition of CO2 and H2 were markedly reduced by antibiotic-supplemented dried skim milk and wheat gluten diets. Addition of lactose to a casein diet did not alter volumes or composition of intestinal gas. However, addition of lactose to a wheat gluten diet resulted in increased intestinal volumes. Supplementation of a wheat gluten diet with amino acids resulted in increased volumes. Corn dextrin and galactose diets resulted in higher intestinal gas volumes, with higher H2 and CO2 and lower N2 and O2 composition values than dextrose and sucrose diets. (Author)

AD-292 642 Div. 16
(TISTB/CCH) OTS price $1.60

Army Medical Research and Nutrition Lab., Denver, Colo.
FATTY ACID COMPOSITION OF PLASMA AND LIVER LIPID COMPONENTS AS INFLUENCED BY DIETARY PROTEIN AND CHOLESTEROL IN GROWING CHICKS,
by Gilbert A. Leveille, Jerry Ann Tillotson and Howerde E. Sauberlich. 4 Sep 62, 17p. incl. illus. table, 23 refs. (Rept. no. 269)
Unclassified report

DESCRIPTORS: *Fatty acids, *Proteins, *Cholesterol, *Lipids, Biochemistry, Diets, Liver, Blood plasma.

Feeding low protein diets to growing chicks results in elevated plasma cholesterol and glyceride levels, but does not alter the plasma lipid phosphorus levels in the absence of dietary cholesterol. Dietary cholesterol elevated all plasma lipid components regardless of dietary protein level; however, the increases were greater in the low protein fed groups. Dietary cholesterol also significantly increased liver lipid levels, more so in the high protein fed animals. The fatty acid composition of plasma and liver cholesterol esters, glycerides and phospholipids was altered by the dietary treatments employed. Although similar changes were noted in all fractions, the phospholipid and glyceride fractions appeared to be refractive to fatty acid changes as compared to the cholesterol esters. Elevations in plasma cholesterol attributable to either low protein or cholesterol feeding were accompanied by decreased linoleic and arachidonic and increased oleic acid levels. The possible relationship of these alterations to atherosclerosis and abnormal lipid metabolism is discussed. (Author)

AD-292 679 Div. 16
(TISTB/CCH) OTS price $5.60

University Coll., Galway (Eire).
THE STRUCTURE OF THE PHYCOBILINS,
by Colm O. hEocha. 29 Sep 62, 48p. incl. illus. table, 58 refs.
(Contract AF 61(052)409)
Unclassified report

DESCRIPTORS: *Proteins, *Algae, Biochemistry, Enzymes.

The literature concerned with the chemistry of algal biliproteins is surveyed. Amino acid analyses of carefully purified samples of R- and C-phycoerythrin, and of C-phycocyanin were performed. All three are characterised by a

high percentage of dibasic and of hydrophobic amino acids. R-, B- and C-phycoerythrins were found to contain methionine as their N-terminal amino acid residue. A proteolytic enzyme preparation was obtained from the blue-green alga Phormidium persicinum. The phycoerythrobilin prosthetic group of R-phycoerythrin was purified and some of its physical and chemical properties determined. The urobilin obtained on isomerization of phycoerythrobilin in concentrated hydrochloric acid was studied, and a number of useful derivatives prepared. It was shown that 12N HCl is required to liberate the native prosthetic group of C-phycocyanin. Two other closely related pigments were isolated from this biliprotein and their physical and chemical properties studied. R-phycocyanin was shown to be a homogeneous chromoprotein containing subunits characteristic of phycoerythrin and of C-phycocyanin. (Author)

AD-292 689 Div. 16
(TISTB/MD) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PHARMACOLOGY AND TOXICOLOGY OF 1,1-DIMETHYLHYDRAZINE (UDMH).
Final rept. for Nov 60-Feb 62 on Toxic Hazards of Propellants and Materials,
by Kenneth C. Back and Anthony A. Thomas. Oct 62, 8p. incl. tables, 8 refs.
(Proj. 6302)
(AMRL TDR 62-118) Unclassified report

DESCRIPTORS: *Methyl hydrazines, Toxicity, Laboratory animals, Emesis, Electrocardiography, Blood pressure, Convulsions, Epinephrine, Acetylcholines, Histamines, Reserpine, Barbiturates, Sleep, Autonomic nervous system, Intestine, Constriction, Drugs, Pharmacology.

The acute LD50 of UDMH by intraperitoneal administration was found to be 125 mg/kg, 104 mg/kg, 60-100 mg/kg, and 60-100 mg/kg, respectively. All animals exhibited clonic-tonic convulsions as the predominant symptom, and death was via respiratory arrest. The animals routinely showed emesis within 15-60 minutes following dose of UDMH, regardless of route. Under anesthetic UDMH did not alter the effects of epinephrine, norepinephrine, acetylcholine, histamine, or reserpine on blood pressure. It did not significantly affect autonomic ganglia or postganglionic nerve endings, nor did it markedly alter the electrocardiogram or blood pressure in 1-2 hours. (Author)

AD-292 690 Div. 16
(TISTB/LH) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
A SOLID STATE MEASURING DEVICE FOR GALVANIC SKIN RESPONSE.
Final rept. for Dec 61-May 62 on Biophysics of Flight,
by Adolph R. Marko, Miles A. McLennan, and Edward G. Correll. Oct 62, 9p. incl. illus. 6 refs.
(Proj. 7222)
(AMRL TDR 62-117) Unclassified report

DESCRIPTORS: *Biophysics, *Galvanic skin response, *Medical equipment, Electroencephalography, Electrocardiography, Electronic equipment, Stability, Instrumentation, Measurement, Acceptability.

Monitoring galvanic skin resistance, especially when used in combination with electrocardiographic or electroencephalographic recordings, is discussed. A new approach is outlined that eliminates interference from other measurements. A small, lightweight laboratory model was built that has low power consumption and is insensitive to vibration and acceleration forces. The performance, stability, and accuracy of the model is equivalent to larger, more conventional instruments used for the same purpose. (Author)

AD-292 704 Div. 16
(TISTB/DGH) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
ONE-MINUTE TOLERANCE IN MAN TO VERTICAL SINUSOIDAL VIBRATION IN THE SITTING POSITION.
Rept. for Dec 60-Dec 61 on Biomechanics of Aerospace Operations,
by Morris J. Mandel and Richard D. Lowry.
Oct 62, 6p. incl. illus. tables, 1 ref.
(Proj. 7231)
(AMRL TDR 62-121) Unclassified report

DESCRIPTORS: *Vibration, Test equipment, Man, Measurement, Stress (Physiology).

One-minute subjective tolerance in man to sinusoidal vertical vibration was determined in the sitting position. In comparing the data to previously published information we noted that, although the new levels were higher, the contour of the curve remained unchanged. The reasons for this difference, as well as specific subjective complaints leading to tolerance, are presented and discussed. (Author)

AD-292 713 Div. 16
(TISTB/LMH) OTS price $6.00

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
BIOLOGISTICS FOR SPACE SYSTEMS SYMPOSIUM.
May 62, 419p. incl. illus. tables, 12 refs.
(Rept. no. AMRL TDR 62-116)
(Proj. 7164)
Unclassified report

DESCRIPTORS: *Symposia, *Closed-cycle ecological systems, *Space flight, Photosynthesis, Algae, Fungi, Metabolic products, Waste gases, Plants, Nutrition, Metabolism, Biology.

This report is a compilation of papers presented at the symposium-workshop on Biologistics for Space Systems sponsored by the 6570th Aerospace Medical Research Laboratories in May 1962. The foundations concerning biologistics for long-term manned space missions are established and basic and applied research phases in developing a complete bioregenerating system are discussed. The state of the art of algal gas exchange systems was fully covered, followed by the most recent concepts on photosynthetic mechanisms that may be applied to closed ecological systems. The potential use of higher plants in bioregenerating systems, especially as gas exchange mechanisms, their broader use as food supplements, and other possible uses were presented. The regeneration, by aerobic and anaerobic means, of solid and liquid wastes with many potential approaches, such as incineration or storage as applied specifically to closed bioregenerating systems, was presented. The final techniçal session included six papers on nutritional support from bioregenerating systems. The potential use of selected algae and

fungi as nutrient sources was considered, the bioecology of the digestive process was presented, and the specific nutritional value of algae and selected fungi was given. (Author)

AD-292 792 Div. 16
(TISTB/MD) OTS price $2.60

Osaka U. Medical School (Japan).
PURIFICATION OF HISTAMINE SENSITIZING FACTOR OF BORDETELLA PERTUSSIS.
Final rept., 1 Oct 61-30 Sep 62,
by Yoshio Kuwajima. 30 Sep 62, 23p. incl. illus. tables, refs.
(Contract DA 92-557-FEC-35587)
Unclassified report

DESCRIPTORS: *Bacteria, Bacterial vaccines, Antigens, Anaphylactic shock, Laboratory animals, Stress (Physiology), Body temperature, Histaminase, Adrenal glands, Corticosteroids, Growth, Growth substances, Purification, Chromatographic analysis, Chemical analysis, Fractionation.

The histamine sensitizing factor (HSF) of B.pertussis cultivated in bulk medium was purified from the culture supernate by anion exchange resin, the method devised by Kuwajima et al. HSF activity was found to be very potent. It was shown that HSF may be identical with serotonine sensitizing factor. It was not identical with lipopolysaccharide of Bordetella pertussis. HSF has no definite potency of preventive antigen and hemagglutination. It was found that histaminase decreasing factor is not identical with HSF. Reduction in body temperature of rats following inoculation of histamine in sensitized rats was able to be restored by administration of adrenal cortical hormones. And adrenal glands sensitized with B.pertussis showed marked changes induced probably by strong stress. (Author)

AD-292 799 Div. 16
(TISTB/LMH) OTS price $1.10

San Jose State Coll., Calif.
DISPLACEMENT OF MIGRATORY BIRDS.
Final rept., 1 Oct 61-31 Dec 62,
by L. Richard Mewaldt. 26 Dec 62, 9p. table.
(Grant Nonr (G) 00030-62, Proj. NR 301-658)
Unclassified report

DESCRIPTORS: *Birds, *Bird navigation, Biology, Bird flight, Ecology, Rhythm, Migration area.

Observations make it evident that the ability to home-navigate is not possessed equally by birds of different races in the same species. It also seems likely that birds require some months to become imprinted with a winter home, and that displacement before ''some months'' may result in a new winter-home. Whether these young birds will return to their ancestral breeding place, or adopt a new breeding ground (as do certain European passerines) is not known. Work in our laboratories (on other projects) provides increasing evidence that Zonotrichia use visual means to interpret the night celestial pattern to orient their night restlessness. It seems not unreasonable that the night sky may be sufficiently familiar to these birds that they use it for return to the home station from distant points. It does not seem that our present concept of a physiological chronometer permits its use for a return to proper longitude in this case. The time taken to return from such a distance (e.g., 14 Apr to 24 June for 1800+ miles) would demand a precision chronometer we have not yet seen demonstrated in birds. Perhaps these birds determine the azimuth of home early in their displacement and this azimuth is then ''remembered'' for the weeks necessary to accomplish the return. Should this be so, a reset chronometer would prevent their return from a displacement in longitude. This can be tested. (Author)

AD-292 908 Div. 16, 4
(TISTM/EJH) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
THE SYNTHESIS OF AMINO-1,2-DITHIACYCLANES.
Annual progress rept., 1 Sep 61-31 Aug 62,
by Harry F. Herbrandson. 1 Aug 62, 10p. incl. tables, 7 refs.
(Contract DA 49-193-md-2058)
Unclassified report

DESCRIPTORS: *Radioprotective drugs, *Sulfur compounds, Amines, Sulfides, Heterocyclic compounds, Benzenes, Sulfonamides, Molecular structure, Chemical reactions, Thiols, Sulfonyl radicals, Ultraviolet spectroscopy, Synthesis.

Cyclic amino disulfides with varying degrees of ring - strain and related dimercaptoamines were prepared. Rearrangement of nitrogen mustard-like intermediates was prevented by blocking the nitrogen with the benzenesulfonyl group prior to the introduction of the sulfur - containing functions. If the nitrogen was not in a position propitious for ring closure and rearrangement, blocking of the nitrogen was unnecessary. Nor were rearrangements of concern when the amino group was introduced subsequent to the introduction of the sulfur functions. (Author)

AD-292 920 Div. 16
(TISTB/CCH) OTS price $1.10

Southwestern Medical School, U. of Texas, Dallas.
EFFECT OF THE SATURATION OF FATS UPON THE DISPOSITION OF INGESTED CHOLESTEROL.
Report for 9 May 61-20 Mar 62 on Studies on Lipid Metabolism Using C14 Labeled Materials,
by James C. McPherson. 20 Mar 62, 10p. incl. tables, 15 refs.
(Contract DA 49-007-md-662)
Unclassified report

DESCRIPTORS: *Fats, *Cholesterol, Diet, Metabolism, Biochemistry, Blood, Labeled substances.

Serum cholesterol levels were lowered when appreciable quantities of highly unsaturated fats were ingested. The mechanism associated with the changes in blood cholesterol level as related to the degree of saturation of the ingested fat was not definitely determined. Rats were fed diets containing 3% corn oil or lard with and without cholesterol and choline for 4 weeks. An attempt was made to learn more about the mechanism involved in the changes in the blood cholesterol level associated with such diets by comparing the total amount of the sterol ingested with that recovered from the carcass tissue, fecal sterols and bile acids. Similar recoveries of activities were attempted in another group of animals given cholesterol-4-C14 after 3 weeks on similar diets. Sterols levels were found to be higher in the blood and carcass tissues of all animals on diets containing extensive amounts of cholesterol, even though a limited amount of it appeared to be absorbed. The amount of fecal sterols and bile acids excreted by rats on the corn oil and lard containing diets was similar,

as was the radioactivity. Lack of measured changes in the disposition of ingested sterols in rats on the high fat diets prevents any definite conclusions as to their roles in the mechanism involved in blood cholesterol changes. (Author)

AD-292 926 Div. 16
(TISTB/MD) OTS price $1.10

Leicester U. (Gt. Brit.).
THE METABOLISM OF SIMPLE COMPOUNDS IN MICRO-ORGANISMS.
Final technical rept.,
by H. L. Kornberg. 20 Sep 62, 8p. incl. illus. refs.
(AF EOAR Grant 61-12)
Unclassified report

DESCRIPTORS: *Bacteria, *Metabolism, Escherichia, Pseudomonas, Biosynthesis, Enzymes, Acetates, Acetamides, Glutamic acid, Biochemistry, Micrococcus, Glyoxylic acid, Coenzymes, Citric acids, Carboxylic acids.

Results obtained indicate that: (1) the formation of isocitrate lyase when E. coli grow on acetate is a consequence of de novo protein synthesis; (2) acetate per se is not an inducer of isocitrate lyase formation but acts in an indirect manner, probably by relieving enzyme repression; (3) growth of Rps. spheroides on acetate, aerobically in the dark or anaerobically in the light, does not involve the glyoxylate cycle; (4) anaerobic growth of an organism, tentatively identified as Cl. kluyveri, on ethanol plus acetate also does not involve the glyoxylate cycle; (5) inducible amidase formation by Ps. aeruginosa growing on acetamide is discontinuous and either the nature of the enzyme formed or its mode of formation is influenced by the nature of the inducing agent; (6) growth of M. denitrificans on glycollate involves a new route in which beta-hydroxyaspartate may be an intermediate; and (7) growth of Pseudomonas sp. on itaconate necessitates its prior activation to itaconyl coenzyme A, which is transformed to pyruvate and acetyl coenzyme A, probably via citramalyl coenzyme A. (Author)

AD-292 942 Div. 16
(TISTB/MD) OTS price $9.10

Alabama U. School of Dentistry, Birmingham.
ANTIMICROBIAL SUBSTANCES IN SALIVA AND ORAL TISSUES.
Annual progress rept. 1 Jan-31 Dec 62,
by Frederick W. Kraus. 31 Dec 62, 107p. incl. tables, refs.
(Contract DA 49-193-md-2280)
Unclassified report

DESCRIPTORS: *Saliva, *Antibodies, Dental caries, Immunology, Mouth, Diseases, Cancer, Man, Electrophoresis, Analysis, Albumins, Freeze drying, Lipoproteins, Hemagglutinins, Decontamination, Proteins.

Seven plasma proteins have been identified immunochemically in saliva and parotid fluid. Gamma globulin was determined quantitatively and its concentrations in both fluids were independent of the presence, in the subjects, of dental caries, periodontal disease or multiple myeloma. Analysis of the gamma-globulins revealed a large number of antibodies detectable by hemagglutination and bacterial agglutination but not by precipitation or complement fixation. A search for complement has been thwarted by anticomplementary effects of both oral fluids. The study of saliva sterilization has produced two simple techniques which reliably kill microorganisms without significantly altering other protein components of saliva. (Author)

AD-292 946 Div. 16
(TISTB/CCH) OTS price $2.60

Army Medical Research and Nutrition Lab., Denver, Colo.
THE DERMAL EXCRETION OF MINERALS AND ITS POSSIBLE RELATION TO MINERAL BALANCE AND REQUIREMENTS (SODIUM, POTASSIUM, IRON, MAGNESIUM AND PHOSPHORUS),
by C. Frank Consolazio, LeRoy O. Matoush and others. 8 Oct 62, 20p. incl. tables, 21 refs.
(Rept. no. 271)
Unclassified report

DESCRIPTORS: *Skin, *Minerals, *Metabolic products, Perspiration, Sodium, Iron, Magnesium, Phosphorus, Urine, Potassium, Excretion.

The results of this study show that a considerable quantity of sodium, potassium, magnesium and iron are lost in sweat of men during 16 consecutive days exposure to environmental temperatures of 100 F. During a 7 1/2 hour collection period, the sweat excretions averaged 0.601 gm/hr for sodium, 0.125 gm/hr for potassium, 2.3 mg/hr for magnesium and 0.13 mg/hr for iron. In the past, with the exception of sodium, very few investigators have recognized the fact that sweat losses could be appreciable, and as a result these losses have been neglected in computing mineral balance. This would result in misinterpretation of the data, especially under conditions of profuse sweating. The inclusion of these mineral losses in sweat should be considered as part of the total losses. This, in turn, would help in estimating more realistic minimal daily requirements. (Author)

AD-292 947 Div. 16
(TISTB/LMH) OTS price $2.60

Army Medical Research and Nutrition Lab., Denver, Colo.
THE SWEAT EXCRETION OF NITROGEN IN RELATION TO BALANCE, ENVIRONMENT AND PHYSICAL ACTIVITY,
by C. Frank Consolazio, Richard A. Nelson and others. 1 Oct 62, 22p. incl. tables, 33 refs. (Rept. no. 270)
Unclassified report

DESCRIPTORS: *Perspiration, *Nitrogen, *Amino acids, Exercise, Heat, Emotions, Physical fitness, Proteins, Skin, Chemical equilibrium, Physiology, Excretion.

The results of two experiments at three environmental temperatures and two levels of physical activity show that a considerable amount of nitrogen is lost in sweat, under conditions that produce profuse sweating. These values average 149, 189 and 241 mg/hour during exposures to temperatures of 70, 85 and 100 F. The free amino acids were approximately one-half of these nitrogen losses, with lysine excretion accounting for approximately 15% of the amino acid losses. The nitrogen losses in sweat of men performing a minimum of physical activity in extreme heat are reduced after acclimatization to heat to approximately 200 mg/hour. It was observed that the nitrogen losses in sweat will increase with an increase in physical activity and sweat rate. These findings are very impor-

tant since they show an additional nitrogen loss that was ignored in many balance studies. Past studies where equilibrium was apparently attained should be reevaluated in the light of these dermal nitrogen losses. (Author)

AD-292 972 Div. 16, 28
(TISTB/MD) OTS price $1.60

Goettingen U. (Germany).
RADIO TRANSMITTED UNIT ACTIVITY IN THE BRAIN-STEM OF CONSCIOUS, UNRESTRAINED CATS.
Final technical rept.,
by Rudolf von Baumgarten. 30 Oct 62, 19p.
10 refs.
(Contract AF 61(052)470)
Unclassified report

DESCRIPTORS: *Brain, Cats, Electrodes, Nervous system, Motor reactions, Radio transmitters, Design, Recording systems, Radio receivers, Stimulation, Physiology, Anesthesia, Electrical properties.

The paper concerns the spontaneous patterns of single nerve cell activity of various structures within the brain in conscious, freely-moving cats. Differences between the anaesthetized and the unanaesthetized preparations were explored and work was started on a neurophysiological brain atlas of cat. (Author)

AD-292 993 Div. 16
(TISTB/CCH) OTS price $1.60

Columbia U. Coll. of Physicians and Surgeons, New York.
STUDIES ON BLOOD VISCOSITY AT LOW SHEAR RATES.
Annual progress rept., 1 Apr-31 Dec 62,
by Magnus I. Gregersen. 31 Dec 62, 7p. illus. table, 9 refs.
(Contract DA 49-193-md-2272)
Unclassified report

DESCRIPTORS: *Blood, Dextran, Erythrocytes, Heparin, Viscosity.

The shear rate dependence of blood viscosity was determined in heparinized dog blood over a wide range of cell concentrations with the Brookfield cone-plate viscometer, the Polarad viscometer and with the G.D.M. viscometer at shear rates ranging from 230 to 0.02 reciprocal seconds. The results are in essential agreement with those recently reported by Wells and Merrill for human blood, showing that viscosity rises sharply as the shear rate is reduced at low values (below 1 per second). The effects of various fractions of dextran (15,000; 45,000; 75,000 and 250,000 M.W.) on the viscosity of blood at low shear rates were determined in blood-dextran mixtures with the same red cell concentration. Marked increase in viscosity was observed with the high molecular fractions, the increase being directly related to the molecular weight. None of the low molecular fractions reduced the viscosity below that in the control blood samples. (Author)

AD-292 999 Div. 16
(TISTB/CCH) OTS price $1.60

Genoa U. (Italy).
ELECTROPHYSIOLOGICAL STUDY OF THE NEURAL MECHANISMS OF SLEEP.
Final technical rept., Oct 60-Sep 62,
by G. F. Rossi. Oct 62, 10p. 27 refs.
(Contract AF 61(052)461)
Unclassified report

DESCRIPTORS: *Sleep, Electric potential, Electrical properties, Stimulation, Electroencephalography, Physiology.

The aim of the research was to study with electrophysiological techniques the neural mechanisms underlying sleep. The findings obtained were summarized: two phases or stages of sleep having very well distinguished electrocortical and somato-visceral characteristics can be recognized in the cat; the desynchronized activity present during the second phase of sleep, or deep sleep, seems to result from a depression of the subcortical EEG synchronizing systems produced by the action of an inhibitory mechanism; adequate electrical excitation of the brain stem reticular formation is followed by the appearance of deep sleep; a transverse unilateral hemisection of the brain stem at pontine level prevents the appearance of the electrocortical rhythms of deep sleep on the ipsilateral cerebral hemisphere; and the same transection decreases or even suppresses deep sleep itself. Findings lead to the following conclusions: the second phase of sleep, or deep sleep, has an active origin, being produced by an inhibitory or sleep-inducing influence; and the inhibitory or sleep-inducing influence responsible for deep sleep takes origin from the caudal brain stem, probably from structures of the rostral half of the pons. (Author)

AD-293 101 Div. 16
(TISTB/LMH) OTS price $1.60

Pisa U. (Italy).
NEUROPHYSIOLOGICAL STUDIES OF CONDITIONING,
by Gianfranco Ricci. 30 June 62, 18p. 18 refs.
(Grant AF-EOARDC 61-36)
Unclassified report

DESCRIPTORS: *Cerebral cortex, *Conditioned reflex, *Nervous system, Motor reactions, Laboratory animals, Vision, Stimulation, Behavior, Reaction (Psychology), Eye, Visual perception, Light adaptation.

The modifications of the visual system during avoidance conditioning to sound have been studied by recording the modifications of cortical and subcortical responses to flashes of light, as well as changes of the pupillary diameter accompanying conditioning. The modifications of the responses evoked in the sensory motor cortex by VPL stimulation have been followed during habituation, early and late stages of conditioning. In this cortical area, modifications of the responses to transcallosal stimulation during conditioning have also been studied. Changes of excitability of the sensory-motor cortex and of the VPL nucleus of the thalamus have been investigated, by studying the variations of responsiveness of the muscles of the arm to electrical stimuli applied to these brain structures during spontaneous and conditioned motor activity. (Author)

AD-293 125 Div. 16
(TISTB/MD) OTS price $1.10

Mount Sinai Hospital, New York.
FINE STRUCTURAL INVESTIGATIONS OF THE RESPONSE OF THE LIVER TO INTRAVENOUS FAT EMULSION.
Progress rept., 1 Apr-1 Dec 62,
by Hans Popper, Fenton Schaffner and others.
1 Dec 62, 2p.
(Contract DA 49-193-md-2258)
Unclassified report

DESCRIPTORS: *Intravenous feeding, *Liver, Electron microscopy, Laboratory animals, Colloids, Pigments, Adrenal glands, Excision, Cells (Biology), Fats, Histology.

The infusion of Lipomul, SR 695 and Intralipid produced pigment and vacuolization of endoplasmic reticulum in hepatocytes when livers were examined electron microscopically. Lipomul produced the most pigment and least vacuolization, and Intralipid the least pigment and most vacuolization. The pigment appeared to be a poorly digestible residue of fat which entered the cell by pinocytosis and was aggregated in lysosomes which remained unchanged for long periods. The nature or significance of the changes in the endoplasmic reticulum are unknown. (Author)

AD-293 132 Div. 16
(TISTM/TCG) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE CONSTRUCTION OF A SMALL MERCURY STRAIN GAUGE,
by C. J. Eagan. Aug 60, 9p. 10 refs. (Technical note AAL TN 60-14)
Unclassified report

DESCRIPTORS: *Mercury, *Strain gages, *Medical equipment, Production, Manufacturing methods, Volume, Heart, Hands, Theory.

A technique is described for making short, low-tension, fine-bore, one-strand gauges suitable for measuring changes in cardiac dimensions and for plethysmography of the human finger or the rabbit ear at various temperatures. They were used for finger plethysmography at ambient pressures as low as 225 mm Hg. (Author)

AD-293 133 Div. 16
(TISTB/MD) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD.
Rept. for 1 May-31 July 60,
by David Rapport. Oct 61, 9p. incl. tables, 4 refs. (Technical note no. AAL TN 60-25)
Unclassified report

DESCRIPTORS: *Fatty acids, *Liver, *Exposure, Glucose, Vitamin A, Enzymes, Metabolism inhibitors, Starvation, Laboratory animals, Biosynthesis, Metabolism.

AD-293 134 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ALTERATIONS IN EFFECTS OF MORPHINE ON THE COLD-ACCLIMATIZED ANIMAL,
by E. Leong Way and H. W. Elliott. Oct 61, 16p. incl. illus. tables, 1 ref. (Technical note AAL TN 60-26)
Unclassified report

DESCRIPTORS: *Exposure, *Morphine, Laboratory animals, Oxygen consumption, Respiration, Carbon dioxide, Temperature, Volume, Toxicity.

Experiments were performed to determine whether adaptation to cold alters the effects of morphine on the minute volume and oxygen consumption of the unanesthetized rat, and on the median effective analgetic (ED50) and median lethal (LD50) doses of morphine in the mice. Some of the data obtained in the rat were reported earlier, but are summarized here in a slightly different form. (Author)

AD-293 135 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD.
Rept. for 1 Aug-31 Oct 60,
by David Rapport. Oct 61, 10p. incl. tables. (Technical note AAL TN 60-31)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Liver, Acetate, Arctic regions, Starvation, Laboratory animals.

Preliminary evidence was reported indicating that lipogenesis may be regulated to a great extent by the generation of an inhibitor. Part of the basis for this conclusion was the finding that, when homogenates from fed rats living at 25 C were separated into a particle-free supernatant fraction by centrifugation at 105,000 x g for 1 hour, the resulting supernatant had less lipogenic activity than the whole homogenate itself. Experiments were carried out with liver homogenate from cold-fasted rats, and the opposite was true--the supernatant was considerably more active in lipogenesis than the whole homogenate itself. (Author)

AD-293 136 Div. 16, 30
(TISTM/EJH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
REFINEMENTS IN PHOTOELECTRIC PLETHYSMOGRAPHY: PART II,
by Alrick B. Hertzman. Sep 61, 12p. incl. illus. table, 12 refs. (Technical note AAL-TN 60-32)
Unclassified report

DESCRIPTORS: *Circulatory system, *Blood circulation, *Blood volume, *Photoelectric cells, *Phototubes, Skin, Low temperature research, Climatic factors, Photoelectric materials, Electronic circuits, Measurement, Medical equipment.

The utilization of photoconductive devices in photoelectric plethysmography should be limited to recordings of the volume pulses if they are subject to rapid changes in temperature. Phototubes are more suitable for climate chamber studies when information on changes in the blood content of the tissue is desired. The differing spectral sensitivity of various photoconductive elements does not seriously affect the accuracy with which the cutaneous volume pulses are recorded, but may grossly distort a plethysmogram. Transistor DC amplifiers offer some advantages for recording. A design for a regulated direct current supply to the light bulb is preferred to the oscillator supply. (Author)

AD-293 150 Div. 16
(TISTB/MD) OTS price $1.60

Oxford U. (Gt. Brit.).
THE METABOLISM OF C1 - COMPOUNDS AND OXALIC ACID IN MICRO-ORGANISMS.
Final technical rept., 1 Sep 61-31 Aug 62,
by Hans Krebs and J. R. Quayle. 30 Sep 62, 19p. 46 refs.
(Contract AF 61(052)180)
Unclassified report

DESCRIPTORS: *Bacteria, *Metabolism, Pseudomonas, Biosynthesis, Mutations, Enzymes, Coenzymes, Glycines, Amino acids, Labeled substances, Tracer studies, Methanols, Formates, Succinates, Carboxylic acids.

Activities of enzymes implicated in a scheme of biosynthesis of cell constituents from C1 growth substrates have been measured in Pseudomonas AMI grown on methanol, formate and succinate, and the values compared. A phosphoenolpyruvate carboxylase from this organism has been purified and its properties studied. Attempts have been made to isolate glycine-serine- orglyoxylate- requiring mutants of Pseudomonas AMI. Oxalyl coenzyme A has been synthesized and its properties examined. Contributions of heterotrophic and autotrophic growth of Pseudomonas oxalaticus on oxalate are being measured.

AD-293 154 Div. 16
(TISTB/SAT) OTS price $1.10

Pennsylvania U. School of Medicine, Philadelphia.
NEUROHUMORAL CONTROL OF THE PITUITARY.
Final rept., 1 Aug 59-31 July 62,
by Samuel McDonald McCann. 21 Nov 62, 6p.
(Contract AF 49(638)685)
Unclassified report

DESCRIPTORS: *Hypothalamus, *Pituitary hormones, ACTH, Secretion, Pituitary gland.

Investigations were carried out to more clearly define the hypothalamic control over the anterior pituitary with particular emphasis on ACTH and gonadotrophins. In the case of ACTH, very little residual ACTH secretion occurs in rats with hypophyses engrafted to the kidney capsule. We were unable to significantly alter the content of stored CRF by altering the titer of circulating corticoids. In the case of the gonadotrophins, hypothalamic lesions lead to elevated secretion of LTH and markedly reduced secretion of LH. Hypothalamic stimulation augments LH secretion and evidence is presented indicating that LH release may be triggered by a hypothalamic LH-releasing factor. Since the conditions governing secretion of LH and ACTH were demonstrated to be different, it is postulated that the LH-RF is different from CRF. Additional studies dealt with the factors governing the secretion and storage of LH. (Author)

AD-293 169 Div. 16
(TISTB/MD) OTS price $3.60

George Washington U. School of Medicine, Washington, D. C.
STUDIES OF PLATELETS.
Annual progress rept., 1 Apr-30 Dec 62,
by Jack J. Rheingold, Edward Adelson, and Arnold A. Lear. 30 Dec 62, 22p. illus. refs.
(Contract DA 49-193-md-2273)
Unclassified report

DESCRIPTORS: *Blood platelets, Thrombosis, Drugs, Labeled substances, Radioactive isotopes, Aging, Dogs, Heparin, Blood coagulation, Man, Inhibition, Survival.

A technique was devised for obtaining a cohort of tagged young platelets in dogs. These studies reveal that dog platelets are randomly destroyed by the process of continuous in vivo coagulation. This process results in a half-life of 1.5 days. Dog platelets begin to die by aging when they reach 8 days, and no platelets survive beyond 12 days of age. However, in the normal dog less than two percent of the platelets survive the random process of destruction for 8 days so that aging plays a negligible role in determining platelet survival. Neither warfarin nor heparin is able completely to stop the process of in vivo coagulation. Of the two, however, heparin appears to be more effective in dogs. A comparable study in humans reveals a similar random process of platelets destruction by continuous in vivo coagulation. The half-life of this process is 2.8 days. Senescence for human platelets begins on day 10 and is complete by day 15. Less than 3% of human platelets survive to day 10 and senescence. Heparin slows the random process of platelet destruction from the normal half-life of 2.8 days to a half-life of 7 days. (Author)

AD-293 172 Div. 16
(TISTB/CCH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EDIBLE PLANT FIELD WORK FOR SUMMER OF 1954,
by Quentin Jones. Dec 56, 28p. incl. illus.
(Technical note no. AAL TN 56-18)
(Proj. 7952)
Unclassified report

DESCRIPTORS: *Plants, Alaska, Toxicity, Acceptability, Food, Ecology.

A study of wild edible plants in Alaska to determine the potential value to aircrew survivors is presented. This work was begun in 1951 with the compilation of an illustrated and annotated list of some 100 edible and poisonous plants of Alaska. The results of the field work conducted under his direction in the summer of 1954 are described. The area covered was confined to the interior of Alaska with particular emphasis on the highlands and active flood plains. Although the data presented here probably typify a good cross-section of the interior, local differences in climate, topography, and geology have undoubtedly brought about many irregularities in the distribution of the four major vegetation types and of particular species within these types. The records of the occurrence of edible and poisonous species should not be taken as implying usable quantities nor availability at all seasons. (Author)

AD-293 173 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 11p. (Technical note no. AAL-TN-56-19)
(Proj. 7952-7; In cooperation with Tufts U., School of Medicine, Boston, Mass., Contract AF 18(600)583)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Stress (Physiology), Laboratory animals, Serum, Radioactivity, Labeled substances, Cholesterol, Acetate, Arctic regions, Alaska, Carbon, Temperature, Liver.

The development or perfection of techniques in the study of metabolism of fatty acids and related substances in animals exposed to cold was investigated. The experiments were all performed on liver slices from 'male' Wistar rats, 3 1/2 to 6 months old, fed on a standard synthetic diet. Control animals were kept at 25 C. (warm rats); the experimental group was exposed to 0-2 C. (cold rats). The food intake of the cold rats was about 1 1/2 times that of the warm rats, while the water intake of the latter was 1 1/2 times that of the former. During a 10-day experimental period the warm rats gained about 7% in body weight, while the cold

rats lost about 6% in the same period. The water content of the whole animal was studied in two warm and two cold rats, and no appreciable difference was found. Certain of the cold rats died with characteristic bodily changes. (Author)

AD-293 174 Div. 16
(TISTB/CCH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 3p. (Technical note no. AAL TN-56-21)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Laboratory animals, Acetates, Carboxyl radicals, Cholesterol, Liver.

Liver slices from rats exposed to 0 to 2 C. environmental temperature from 24 to 48 hours showed in a Krebs - HCO3 medium, a greatly depressed capacity to synthesize fatty acids from carboxyl labeled acetate, while the conversion to cholesterol was not affected and there was only a slight decrease in acetate oxidation. After 5 to 10 days of exposure to cold, fatty acid synthesis was partly restored, CO2 production had risen above normal, and cholesterol synthesis was still not greatly affected. Glucose added to the medium in 400 mgm. % concentration was found to increase liver fatty acid synthesis in the cold-exposed as well as the control animals, as did glucose administered by stomach tube before the experiment. The evidence indicated that fatty acid synthesis was a linear function of the liver carbohydrate content at levels about 4% or above, but that acetate oxidation by liver was depressed only at much lower levels of carbohydrate content. The effect of glucose on cholesterol synthesis was obscure, except a marked increase of cholesterogenesis was observed when a cold-exposed animal was flooded with carbohydrate. (Author)

AD-293 175 Div. 16
(TISTB/CCH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 5p. (Technical note no. AAL-TN-56-22)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Carbon, Labeled substances, Pyruvates, Glucose, Laboratory animals, Cholesterol, Arctic regions, Radioactivity, Liver.

Addition of glucose to the incubation medium has proved to be so effective in reversing the changes in hepatic acetate metabolism that occurred with cold-exposure or fasting or both, experiments to test the effect of intermediates of carbohydrate metabolism were made. The addition of pyruvate to the incubation medium caused pronounced changes in the amount of acetate-C14 incorporated into C1402, fatty acids and cholesterol by metabolizing liver slices. These slices were prepared from control rats, 1-day cold-exposed rats, 1-day fasted rats, 1-day cold-exposed and 1-day cold-fasted rats. (Author)

AD-293 176 Div. 16
(TISTB/CCH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 9p. (Technical note no. AAL-TN-56-23)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Liver, Labeled substances, Pyruvates, Carbon, Acetates, Laboratory animals, Cholesterol.

AD-293 177 Div. 16
(TISTB/CCH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 8p. incl. tables. (Technical note no. AAL-TN-56-24)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Pyruvates, Acetates, Carbon, Labeled substances, Laboratory animals, Liver, Glucose, Butyrates.

AD-293 178 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 10p. incl. tables. (Technical note no. AAL-TN-56-25)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Liver, Laboratory animals, Butyrates, Acetates, Glucose, Enzymes, Sucrose.

AD-293 179 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 11p. incl. tables.

(Technical note no. AAL-TN-56-26)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)

Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Acetates, Laboratory animals, Carbon, Labeled substances, Glucose, Phosphates, Oxygen consumption, Liver.

AD-293 180 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 11p. incl. illus. tables (Technical note no. AAL-TN-56-27)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)

Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Laboratory animals, Liver.

AD-293 181 Div. 16
(TISTB/CCH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 9p. incl. tables. (Technical note no. AAL-TN-56-28)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)

Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Butyrates, Acetates, Liver, Labeled substances, Arctic regions, Laboratory animals.

AD-293 182 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD,
by David Rapport. Dec 56, 17p. incl. tables. (Technical note no. AAL-TN-56-31)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)

Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Liver, Radioactivity, Fatty acid esters, Carbon, Labeled substances, Glucose, Acetates, Butyrates, Carbohydrates, Blood sugar, Starvation, Arctic regions, Laboratory animal.

AD-293 183 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECT OF COLD EXPOSURE AND FASTING ON HEPATIC ACETATE METABOLISM,
by E. J. Masoro, Arthur I. Cohen, and Sylvia S. Panagos. Dec 56, 11p. incl. illus. tables, 13 refs. (Technical note no. AAL-TN-56-32)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)

Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, Starvation, Liver, Carbohydrates, Temperature, Acetates, Oxiation, Laboratory animals.

The ability of hepatic tissue to oxidize acetate is greatly affected by the carbohydrate content and extent of carbohydrate metabolism in the liver is described. A detailed study of the relationship between hepatic carbohydrate content and acetate oxidation was therefore undertaken. In the present investigation the carbohydrate content of the liver was drastically reduced by fasting rats both at 25 C. and 0 C. Acetate oxidation is greatly depressed by the lowering of the hepatic carbohydrate level. (Author)

AD-293 184 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECT OF EXPOSURE TO COLD ON SOME ASPECTS OF HEPATIC ACETATE UTILIZATION,
by E. J. Masoro, Arthur I. Cohen and Sylvia S. Panagos. Dec 56, 17p. incl. illus. tables, 22 refs. (Technical note no. AAL-TN-56-33)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 41(657)145)

Unclassified report

DESCRIPTORS: *Metabolism, *Liver, *Exposure, *Fatty acids, Labeled substances, Acetates, Cholesterol, Oxidation, Laboratory animals.

Liver slices were prepared from control rats kept at 25 C. and cold rats exposed to 0-2 C. for 1, 2, 5, and 10 days. The slices were incubated for 3 hours in bicarbonate buffer solution containing 10 mg. % sodium acetate-C14 at 37.5 C. The ability of these slices to convert the C14-acetate to C14-fatty acids, C14O2, and C14-cholesterol was determined. (Author)

AD-293 185 Div. 16
(TISTB/CCH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE EFFECT OF PROLONGED COLD EXPOSURE ON HEPATIC LIPOGENESIS,
by E. J. Masoro, J. M. Felts and Sylvia S. Panagos. Dec 56, 9p. incl. tables, 12 refs. (Technical note no. AAL-TN-56-36)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 18(600)583)

Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Exposure, *Liver, Acetates, Carbohydrates, Laboratory animals.

Studies of hepatic lipogenesis to rats that have lived in the cold successfully for several months -cold-adapted rats are presented. Liver slices from these cold-adapted rats also showed depressed lipogenesis, but the surprising finding is that this reduction in fatty acid synthesis is not the result of a curtailed hepatic carbo-

hydrate metabolism. Two aspects of hepatic acetate metabolism were studied under these conditions: oxidation of acetate-1-C14 to C1402 and incorporation of acetate-1-C14 into long chain fatty acids. (Author)

AD-293 187 Div. 16
(TISTB/MD) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE EFFECT OF PROLONGED COLD EXPOSURE ON THE IN VITRO RESPIRATION AND ANAEROBIC GLYCOLYSIS OF RAT LIVER,
by John P. Hannon. June 57, 16p. incl. illus. 12 refs. (Technical note no. AAL-TN-57-4)
(Proj. 7951-25)
Unclassified report

DESCRIPTORS: *Metabolism, *Exposure, Rats, Liver, Starvation, Oxygen consumption, Stimulation, Glucose, Lactates, Glycolysis, Controlled atmospheres.

Liver slices were prepared from rats that had been exposed to cold (5±1 C.) for intervals of 2, 4, 6 or 9 weeks, and assays were made for respiratory rate and the rate of anaerobic glycolysis. The results of the respiration experiments indicated the first 4 weeks' cold exposure was associated with increasing QO2 values, whereas exposure longer than 4 weeks was associated with QO2 values that returned toward the control value. The results indicated further that the exact nature of the substances being metabolized in the conventional tissue slice experiment was unknown. The results of the anaerobic experiments indicated the rate of anaerobic glycolysis decreased progressively as the duration of cold exposure was increased. (Author)

AD-293 188 Div. 16
(TISTB/MD) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE ROLE OF CARBOHYDRATE METABOLISM IN PROMOTING FATTY ACID OXIDATION,
by E. J. Masoro and J. M. Felts. Nov 57, 17p. incl. tables, 18 refs. (Technical note no. AAL-TN-57-36)
(Proj. 7952-7; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 41(657)145)
Unclassified report

DESCRIPTORS: *Fatty acids, *Carbohydrates, *Metabolism, Carboxylic acids, Glucose, Stimulation, Liver, Rats, Starvation, Glycogen, Exposure, Labeled substances, Radioactive isotopes, Tracer studies, Stearic acids, Valeric acids, Sodium palmitates, Oleic acids, Octanoic acids, Laurates, Capric acids, Butyrates, Acetates, Lactates, Succinates, Propionic acids, Oxidation.

The effect of carbohydrates on the oxidation of various fatty acids was studied in liver slices from normal and cold-fasted rats. The resulting evidence indicates that, while carbohydrate metabolism appears to be necessary for an optimal rate of fatty acid oxidation, it apparently is not a function of the 'sparking' action of oxalacetate or other Krebs cycle intermediates. (Author)

AD-293 189 Div. 16
(TISTB/MD) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
STUDY OF ALASKAN SCHISTOSOMES,
by Reinard Harkema. June 53, 26p. incl. illus. table, 9 refs. (Technical rept. no. AAL-TR-48)
(Proj. 22-1401-0005; In cooperation with North Carolina State Coll., Raleigh, N. C., Contract AF 18(600)187)
Unclassified report

DESCRIPTORS: *Schistosoma, *Snails, Man, Disease carriers, Skin, Pathology, Diseases, Birds, Epidemiology, Alaska.

The survey of Alaskan schistosomes (blood flukes) of military-medical importance resolved itself into a collection of snails which are the intermediate hosts of the worms and which release infective, penetrating cercariae. A total of seventy-six bodies of water was investigated during the summer of 1952. Sixteen were found to harbor snails infected with the itch-producing cercariae. Infested sites were in the Fairbanks area, Yukon flats, near the Tok and lower Alaska Highways. Ten species of snails were found and the two most common species, Lymnaea palustris L. stagnalis were found to harbor the cercariae. The highest incidence of schistosome cercariae was in late July and August. Natural clinical cases of schistosome dermatitis were found and the itch-producing ability of the located cercariae was demonstrated in all instances. The general syndrome of schistosome dermatitis is discussed. A limited study of the morphology of the cercariae is presented and the behavior of the liberated cercariae is discussed. Additional morphological, ecological, and life history studies are necessary before positive identification can be made. (Author)

AD-293 190 Div. 16
(TISTB/MD) OTS price $3.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
A SURVEY OF INVERTEBRATE DISEASE VECTORS IN ALASKA,
by John M. Geary. Nov 53, 37p. incl. illus. tables, 23 refs. (Technical rept. no. AAL-TR-54, Research rept. no. 1)
(Proj. 22-1401-0004)
Unclassified report

DESCRIPTORS: *Insects, *Disease carriers, *Parasites, Animals, Fleas, Ticks, Schistosoma, Diseases, Mammals, Collecting methods, Alaska.

AD-293 194 Div. 16
(TISTB/MD) OTS price $4.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
HEAT LOSS FROM THE RESPIRATORY TRACT IN COLD,
by Paul Webb. Apr 55, 41p. incl. illus. tables, 37 refs. (Technical rept. no. 67; Rept. no. 3)
(Proj. 7-7951; In cooperation with Oklahoma U. School of Medicine)
Unclassified report

DESCRIPTORS: *Respiration, *Heat transfer, Man, Heat exchangers, Body temperature, Water vapor, Temperature, Arctic regions, Exposure, Hygrometer, Design, Thermometers, Thermocouple, Respiratory system.

Methods especially suited for measuring the temperature and water vapor content of expired air have been developed. A new instrument for measuring water vapor, the dielectric hygrometer, is described. Temperature and water vapor content of expired air were measured in standing resting subjects at ambient temperatures ranging from 0 to -40C. From these and from previous measurements it is found that expired air leaves the nose at temperatures corresponding to the

following rule: starting at an ambient temperature of 25C, where the expired air is 34C, for every 5C reduction of ambient temperature there is a 1C drop in the temperature of expired air. In cold conditions expired air is always saturated or supersaturated with water vapor, at the temperature corresponding to the above rule. Heat loss calculations made on the basis of these findings, and assuming a median figure of 600 liters per hour for standing resting ventilation, show that a man in 0C air loses 14 kg-cal/hour through the respiratory tract. A man in -20C air loses 15 kg-cal/hour, and in -40C he loses 17 kg-cal/hour. These values are lower by 50 to 60% than calculated values based on the assumption that expired air is at body temperature (37C) and saturated. This represents a considerable and useful conservation of heat. Heat conservation in the respiratory tract is most noticeable in very cold environments. The mechanism involved simulates that of a simple heat exchanger. (Author)

AD-293 207 Div. 16
(TISTB/MD) OTS price $1.10

Biological Labs., Frederick, Md.
FLUOROCHROME STUDIES OF MICROORGANISMS IN LIQUID MEDIA,
by H. Eder. Dec 62, 4p. (Trans. no. 700)
Unclassified report

DESCRIPTORS: *Microorganisms, *Biological stains, Staphylococcus, Serratia, Bacillus subtilis, Clostridium botulinum, Molds, Bacteria, Fluorescent dyes.

Fluorochrome studies of microorganisms in physiological saline solution are reported. In one study suspensions of the organisms were mixed with the fluorochrome solutions and in another the organisms were added to the slides pretreated with fluorochromes. It was found that 16 fluorochromes produce fluorescent staining of microorganisms, with an especially high degree of differentiation achieved with Acridine Yellow and Acridine Orange. The ground fluorescence of the fluorochromes is so slight that it has no appreciable effect on the test results. (Author)

AD-293 213 Div. 16
(TISTB/LMH) OTS price $7.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON Q FEVER.
7 Oct 54, 77p. refs.
Unclassified report

DESCRIPTORS: *Bibliography, *Q fever, Epidemiology, Immunization, Bacterial vaccines, Serum, Insects, Disease carriers, Chemotherapeutic agents, Rickettsia.

AD-293 214 Div. 16
(TISTB/LMH) OTS price $13.00

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON PLAGUE AND PASTEURELLA PESTIS.
1 Jan 54, 182p. refs.
Unclassified report

DESCRIPTORS: *Bibliography, *Plague, *Pasteurella, Epidemiology, Therapy, Immunology, Diseases.

AD-293 226 Div. 16, 10
(TISTB/CCH) OTS price $2.25

Farr Cytochemical Labs., Camden, Maine.
CYTOCHEMICAL STUDIES OF FUNGI WHICH CONTAMINATE AIRCRAFT FUELS AND DETERIORATE MATERIALS.
Final rept., Feb 61-Feb 62 on Aviation Fuels,
by Wanda K. Farr. Nov 62, 77p. incl. illus.
76 refs.
(Contract AF 33(616)7891, Proj. 3048)
(AMRL TDR 62-132) Unclassified report

DESCRIPTORS: *Histology, *Microorganisms, *Aviation fuels, Fungi, Materials, Aircraft, Deterioration, Escherichia, Bacteria, Chemistry, Contamination.

Cytochemical analyses of the fungus, Aspergillus niger ATCC 6275, have revealed the presence of chitin in the longitudinal and cross walls of the hyphae, chitin in the primary lamellae, and both chitin and cellulose in the secondary lamellae of the walls of conidiophores, vesicles, and conidia. Similar analyses have shown the presence of chitin alone in the walls of the corresponding cells of the fungus, Myrothecium verrucaria ATCC 9095. Adaptations of standard cytochemical procedures to the identification of cell wall materials in the bacterium, Pseudomonas aeruginosa ATCC 13388, have indicated the probable presence of chitin in the primary, and cellulose in the secondary, wall lamellae. Attempts to identify cell wall materials in the bacterium, Escherichia coli K12 10798, have shown definite differences in the make-up of the primary and secondary wall lamellae and the possible presence of cellulose in the secondary deposits. These four organisms are among those which contaminate aviation fuels. Information concerning the nature and location of the resistant substances which make up their cell walls can be used in developing methods of treatment which will lead to their control. (Author)

AD-293 238 Div. 16
(TISTB/LMH) OTS price $1.10

Galveston Marine Lab., Tex.
(No title).
Rept. for 15 Jan-1 Aug 62,
by Albert Collier. 1 Aug 62, 5p. incl. tables.
(Contract Nonr-211903)
Unclassified report

DESCRIPTORS: *Marine biology, *Sea water, Protozoa, Algae, Lipids, Steroids, Microorganisms, Fatty acids, Surfaces.

Principal effort has been on the culture of plankton organisms and the composition of lipid metabolites. Sargassum (actually a mixture of Sargassum natans and S. fluitans) yielded a mixture containing approximately 60% of unsaturated acids. Of these acids, oleic acid was 12%, linoleic 6%, linolenic 7%, octadecatetraenoic 7%, arachidonic 13%, and eicosapentaenoic 7%; the remainder were minor acids. The major saturated acid was palmitic, composing about 30% of the total. The remainder was distributed over a number of minor acids including a total of 0.59% odd acids. The ctenophore, Beroe, contained over 60% unsaturated acids. Outstanding among these were oleic, 12%, arachidonic, 10%; docosapentaenoic (clupanodonic) 19%; and hexacosedienoic, 4%. The major saturated acids were palmitic, 13%, and stearic, 12%. There were three odd acids totaling 3.9%. The remainder of the components were minor identified and unidentified materials. It is of interest that 42% of the fatty acids produced by this organism were unsaturated groups containing from 20-26

carbon atoms. It remains to be seen whether these groups are related to the highly surface active and water soluble extracts from ctenophores. (Author)

AD-293 249 Div. 16
(TISTB/MD) OTS price $1.60

London U. (Gt. Brit.).
THE STUDY OF THE MECHANISM OF TRANSFORMATION OF PHYSICAL ENERGY INTO NERVE ACTIVITY IN THE INTERNAL EAR.
Technical rept. (Final),
by F. C. Ormerod. Mar 62, 15p. refs.
(Contract AF 61(052)271)
(AFOSR 2910) Unclassified report

DESCRIPTORS: *Auditory perception, *Hearing, *Ear, Hypothyroidism, Deafness, Anatomy, Metabolism, Mucosaccharides, Labeled substances, Radioactive isotopes, Tracer studies, Animals, Potassium compounds, Vestibular nerve, Echo ranging, Electrical properties, Butterflies, Biochemistry, Bats, Anatomical models, Ethanols, Streptomycin, Pathology, Electron microscopy, Man, Drugs, Scopolamine, Motion sickness, Vertigo, Laboratory animals, Thiouracil, Ultrasonic properties, Physiology, Histology.

A very full investigation has been made into the carbohydrate metabolism in the ear of the pigeon. Experiments on the vestibule in pigeons have established the presence of acetylcholinesterase. Administration of nocuous chemical substances, alcohol, quinine, streptomycin and thiouracil has not been followed by any changes demonstrable by light microscopy. Rotatory, caloric and positional tests of the vestibular labyrinth have been carried out in man and animals under a variety of positions and conditions, and after the ingestion in man and the injection in animals of various chemical substances. Echolocation was studied, and the noise-emitting and receptor mechanism of certain moths and the direction finding procedures used by owls were investigated. The properties of ultrasonic vibrations were investigated. Anatomic and histologic preparations of the skulls and ears of a wide variety of small animals were made. (Author)

AD-293 272 Div. 16
(TISTB/MD) OTS price $1.60

Boston U., School of Medicine, Mass.
THE EFFECT OF SELECTED PHYSICAL PARAMETERS ON THE TRANSFER THROUGH BIOLOGICAL MEMBRANES OF COMPOUNDS OF VARYING CHEMICAL TYPES.
Final rept., 1 Sep 61-31 Aug 62,
by Ruth R. Levine. 10 Dec 62, 14p. incl. illus. tables, 7 refs.
(Grant DA-CML-18-108-G-32)
Unclassified report

DESCRIPTORS: *Intestine, *Absorption, *Quaternary amines, Rats, Neuromuscular transmission, Toxicity, Tubocurarines, Muscle relaxants, Peptides, Oximes, Animal extracts.

The phosphatido-peptide fraction extracted from intestine has been found to markedly increase the intestinal absorption of the quaternary ammonium compounds, oxyphenonium, hexamethonium, secergan, and benzomethamine. This fraction also has been found to markedly decrease the neuromuscular blocking and lethal dose of tubocurarine without changing the characteristic pharmacologic activity of the latter. Intesinal absorption studies were carried out with five salts of 2-PAM: I(-), Cl(-), H2PO4(-), CH3SO3 and tartrate. The rate of absorption of the tartrate was found to be slower initially than that of the other four salts. At the end of two hours all the salts were absorbed to about the same degree. (Author)

AD-293 289 Div. 16
(TISTB/MD) OTS price $1.10

Oregon U., Eugene.
MOLECULAR BASIS OF MUTATION.
Final rept.,
by Aaron Novick. 1962, 3p.
(Contract Nonr-277101, Proj. NR 388-062)
Unclassified report

DESCRIPTORS: *Mutations, *Enzymes, Genetics, Heat, Stimulation, Chromosomes, Proteins, Bacteria, Biosynthesis.

The ability of certain mutant bacteria to make unusually large quantities of the enzyme beta-galactosidase has been studied. Some effort has also been spent on a mutant in which the system regulating the production of beta-galactosidase is heat labile. (Author)

AD-293 404 Div. 16
(TISTB/MD) OTS price $8.60

Health Research, Inc., Buffalo, N. Y.
STUDIES ON RESUSCITATION AND ARTIFICIAL RESPIRATION.
Progress rept., 1 Jan-31 Dec 62,
by James O. Elam and Elwyn S. Brown. 31 Dec 62, 96p. incl. illus. tables, 12 refs.
(Contract DA 49-007-md-507)
Unclassified report

DESCRIPTORS: *Anesthesia, *Respirators, *Artificial respiration, *Cholinesterase, Training, Man, Anoxia, Oxygen consumption, Respiration, Electrocardiography, Blood plasma, Serum, Pathology, Inhibition, Muscles, Electrical properties, Dogs, Medical equipment, Control systems, Tests.

Contents:
A portable halothane - air anesthetic device
Halothane - air anesthesia with assisted ventilation
A compact simple flow-controlled ventilator
Independent control of inspiratory flow and time in mechanical ventilation
Clinical evaluation of ACC MEDL resuscitator
Calculated time course of obstructive asphyxia in man and prediction of recovery rates of arterial oxygenation with various volumes of expired air inflations
Case report: ventricular pressures in man produced by external heart compression and injection of epinephrine during recovery from cardiac arrest
A pneumatic external heart compressor for controlled study of anatomical mechanics and trauma
Effects of hyperventilation upon the distribution of lung gases in the anesthetized emphysematous patient
Breathing circuit design for optimal CO(2) elimination without absorbent
A rapid method for plasma cholinesterase
Electromyographic studies in man and dogs

AD-293 409 Div. 16, 28
(TISTB/MD) OTS price $3.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
TECHNICAL DOCUMENTARY REPORTS AND TECHNICAL NOTES.
1962, 1v.
Unclassified report

DESCRIPTORS: *Bibliography, *Arctic regions, Exposure, Stress (Physiology), Stress (Psychology), Man, Laboratory animals, Behavior, Survival, Pathology, Metabolism, Biochemistry, Physiology, Infections, Cardiovascular system, Protective clothing, Animals, Diet.

AD-293 415 Div. 16
(TISTB/MD) OTS price $3.60

Pittsburgh U. School of Medicine, Pa.
A STUDY OF ARTIFICIAL RESPIRATION AND RESUSCITATION.
Body of Army progress rept., 1 Jan-31 Dec 62,
by Peter Safar and Leroy Harris. 31 Dec 62, 38p. incl. tables.
(Contract DA 49-193-MD-2160)
Unclassified report

DESCRIPTORS: *Heart arrest, *Artificial respiration, *Arrhythmia, *Plasma substitutes, Blood circulation, Dogs, Epinephrine, Cannulation, Respirators, Blood chemistry, Electrocardiography, Electroencephalography, Blood pressure, Blood volume, Man, Therapy, Anemia.

In dogs with ventricular fibrillation, various combinations of external cardiac compressions (ECC) and lung inflations were studied. Measurements of arterial pressures and flows and arterial O2, CO2 and pH values were made. These data and clinical experience with resuscitation attempts made us recommend a lung inflation/ECC ratio of approximately 3/15 for the not intubated patient. Constant manual pressure over the abdomen during ECC increased carotid and femoral artery flows and pressures. Epinephrine given subcutaneously over the sternum or I.V. during ECC did not significantly increase artificial arterial flows. Epinephrine or nor-epinephrine given intravenously immediately before or after defibrillation increased greatly, spontaneous arterial pressures and flows. Dextrane (20% of estimated blood volume) given intravenously raised artificial arterial flows and pressures during ECC, the same as given intra-arterially (Normovolemic dogs). The respirator of the Beck-Rand ECC machine was modified and evaluated for laboratory use in intubated dogs. (Author)

AD-293 455 Div. 16
(TISTB/MS) OTS price $7.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON BOTULISM AND CLOSTRIDIUM BOTULINUM.
1 Oct 52, 69p.
Unclassified report

DESCRIPTORS: *Bibliography, *Clostridium botulinum, *Botulism.

AD-293 481 Div. 16
(TISTB/MD) OTS price $1.10

Biological Labs., Frederick, Md.
EXPERIMENTAL INVESTIGATION OF DERMACENTOR SILVARUM TICKS AS CARRIERS OF VERNAL ENCEPHALITIS VIRUS,
by A. N. Skrynnik and N. V. Ryzhkov. Dec 62, 4p. (Translation no. 704, Trans. from All-Union Conference of Microbiologists and Epidermiologists, pp. 318-320, January 1939).
Unclassified report

DESCRIPTORS: *Ticks, *Encephalitis viruses, Transmission, Infections, Virus diseases, Epidemiology, Mice, Survival, Disease carriers.

In the investigated focus of vernal encephalitis, in addition to other Ixodic ticks, the Dermacentor silvarum tick was encountered rather frequently. The possibility was established that the virus can be retained in the body of experimentally infected adult ticks up to 28 days; moreover this time period is not a maximum one. The possibility was proven that virus can be transmitted from one generation of ticks to another (transovarial transmission). (Author)

AD-293 614 Div. 16
(TISTB/MD) OTS price $1.10

Pennsylvania U., Philadelphia.
THE ACTION OF DRUGS ON FUNCTION AND PHOSPHORYLASE ACTIVITY.
Semi-annual rept., 30 June 61-1 Apr 62,
by Niels Haugaard. 14 Mar 62, 3p. 9 refs.
(Contract DA 18-108-405-cml-630)
Unclassified report

DESCRIPTORS: *Phosphorylases, *Metabolism, Acetylcholines, Pyrocatechol, Amines, Ergot alkaloids, Epinephrine, Rats, Autonomic nervous system, Stimulation, Inhibition, Reserpine, Glucose, Metabolism, Glycogen, Heart, Liver, Muscles, Drugs, Carbohydrates.

17. METALLURGY

AD-291 995 Div. 17, 14
(TISTM/ODN) OTS price $2.60

Forest Products Lab., Madison, Wis.
MECHANICAL PROPERTIES OF SEVERAL HONEYCOMB CORES,
by Gordon H. Stevens and Edward W. Kuenzi.
July 62, 9p. illus. tables (Rept. no. 1887)
(Contract AF 33(616)61-06)
Unclassified report

DESCRIPTORS: *Honeycomb cores, *Sandwich construction, *Aluminum, Density, Thickness, Elasticity, Shear stresses, Foils, Reinforcing materials, Resins, Glass textiles, Asbestos fiber, Phenolic resins, Silicone resins.

Mechanical properties of several aluminum and reinforced plastic honeycomb cores are presented along with details of the methods used to determine them. Properties that were evaluated included density, foil thickness, flatwise compressive strength, compressive modulus of elasticity, shear strength, and shear modulus. Analysis of experimental data includes relationships between compressive strength and density, between compressive and shear strength, and between shear properties in two principal directions. (Author)

AD-292 005 Div. 17, 14
(TISTM/ODN) OTS price $1.60

Forest Products Lab., Madison, Wis.
EFFECT OF CORE THICKNESS ON SHEAR PROPERTIES OF ALUMINUM HONEYCOMB CORE,

by Paul M. Jenkinson and Edward W. Kuezni.
July 62, 8p. incl. illus. tables, 5 refs.
(Rept. no. 1886)
(Contract AF 33(616)61-06)
Unclassified report

DESCRIPTORS: *Honeycomb cores, *Sandwich construction, *Aluminum, Shear stresses, Stresses, Mechanical properties, Loading, Physical properties, Thickness.

The effect of variations in thickness from 1/2 inch to 4 inches on shear properties of an aluminum honeycomb core was evaluated. Preparation of shear specimens and evaluation procedures are described. Results showed that shear strength parallel to the core ribbon direction decreased 36% and shear strength perpendicular to the core ribbon direction decreased 23% as core thickness increased from 1/2 inch to 4 inches. Shear properties of 1/2-inch-thick core were identical whether determined by tension or compression loading. (Author)

AD-292 029 Div. 17
(TISTM/ODN) OTS price $1.60

Williams, Clyde, Corp. (Gt. Brit.).
INVESTIGATION OF VARIATIONS IN RAW MATERIALS AND PRODUCTION PROCESSING ON THE PROPERTIES OF TUNGSTEN METAL SHEET.
Interim rept. no. 2, 1 Aug-31 Oct 62.
Nov 62, 10p. incl. illus.
(Contract N62558-3235)
Unclassified report

DESCRIPTORS: *Tungsten, *Powder metals, Zinc, Reduction, Particles, Tungsten compounds, Oxides, Hydrogen, Carbides, X-ray diffraction analysis, Sheets, Processing, Impurities, Electrolysis, Cyanides, Powders.

Preparation of fine particle W powder by reduction with metallic zinc was continued. With respect to impurities the prepared W powder corresponds completely to that of Ugine-carbone and is almost comparable to the W powders produced by MP-Reutte and by Fansteel. The particle size observed was 0.3 - 0.5 U. Further experiments for W powder preparation were made by electrolysis as well as by cyanide - reduction. Extremely fine particle size W powder was prepared by electrolysis. The main product was not identified. A photosedimentometer of a new type was constructed and checked for particle size and size distribution measurements. The apparatus for reduction of WCl6 with hydrogen in the gas phase is under construction. (Author)

AD-292 061 Div. 17
(TISTM/REB) OTS price $4.60

Stanford U., Calif.
RELATION OF PROPERTIES TO STRUCTURE IN SINTERED ALUMINUM POWDER,
by Charles L. Meyers, Jr., John C. Shyne, and Oleg D. Sherby. 15 Oct 62, 29p. incl. illus. 26 refs. (Technical rept. no. 1; DMS rept. no. 62-10)
(Contract Nonr-22560, Proj. NR 031-682)
Unclassified report

DESCRIPTORS: *Aluminum, *Powder metals, *Sintering, Mechanical properties, Thermal expansion, Aluminum compounds, Oxides, Crystal structure, Dispersion hardening.

The mechanical, textural and thermal expansion properties of sintered Al powder containing 7 and 14% alumina were studied extensively in the temperature range 550 to 800 C. The experimental observations, together with the results of other investigations, suggest that commercial SAP in the extruded form is a fine grained material containing a continuous alumina network interpenetrating an aluminum matrix. The alumina network appears to consist of a honeycomb of elongated cells with porous walls. In addition, the material contains discrete particles of alumina. The strength and plastic flow characteristics of SAP above 550 C and up to at least 735 C is believed to be controlled primarily by the presence of the continuous alumina network. It is possible, however, that below 550 C the alumina network may play a less important role and the high strength of SAP may be derived from its fine stable grain size and to the close spacing of the alumina particles. (Author)

AD-292 062 Div. 17
(TISTM/REB) OTS price $4.60

Astronuclear Lab., Westinghouse Electric Co., Pittsburgh, Pa.
PILOT PRODUCTION AND EVALUATION OF TANTALUM ALLOY SHEET.
Quarterly rept. no. 2, 16 July-16 Oct 62,
by R. L. Ammon and R. T. Begley. 16 Nov 62, 37p. incl. illus. tables, 8 refs. (Rept. no. WANL-PR-M-002)
(Contract NOw 62-0656-d)
Unclassified report

DESCRIPTORS: *Tantalum alloys, *Sheets, Industrial production, Tensile properties, Crystallization, Deformation, Stresses, Rupture, Tungsten alloys, Hafnium alloys, Melting, Processing, Welds, Mechanical properties.

Additional information is presented regarding tensile properties, recrystallization behavior, weld bend ductility and stress rupture properties for the base composition, Ta-8W-2Hf, designated as T-111. Melting and processing data for interstitial-containing T-111 alloy heats are presented. The melting, processing, and tensile properties of T-111 alloy modified with respect to W and Hf content are also given. Work on other Ta-base alloys is presented. (Author)

AD-292 186 Div. 17
(TISTM/EJH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METAL SCIENCE AND HEAT TREATMENTS OF METALS (SELECTED ARTICLES).
14 Nov 62, 22p. incl. illus. tables, 17 refs.
(Trans. no. FTD-TT-62-1169 from Metallovedeniye i Termicheskaya Obrabotka Metallov, no. 1:pp. 38-40, 57-64, 1962)
Unclassified report

DESCRIPTORS: *Metallurgy, *Nickel alloys, *Molybdenum alloys, Heat resistant alloys, Deformation, Heat treatment, Plasticity, Microstructure, Hardness, Crystal structure, USSR, Phase transitions, Mechanical properties.

Contents:
Effect of high-temperature plastic deformation on the mechanical properties of heat resistant nickel-base alloys
Investigation of the polygonization of molybdenum by means of high temperature metallography

AD-292 200 Div. 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COLD HARDENING AND RECRYSTALLIZATION OF EI617 ALLOY,

by Ya. M. Okhrimenko, M. S. Tsibanova and N. S. Shibalov. 31 Oct 62, 11p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-1318 from Izvestiya VUZ Chernaya Metallurgiya, no. 3, pp. 95-102, 1962)
Unclassified report

DESCRIPTORS: *Alloys, *Crystallization, Deformation, Plasticity, Microstructure, Stresses, Grains (Metallurgy), Mechanical properties, Forging, USSR, Precipitation, Heat treatment.

The purpose of this report is to investigate recrystallization of EI617 alloy and to establish maximum temperature range for deformation with removal of cold hardening in the period of deformation. Investigation was made of the phenomena of cold hardening and recrystallization of EI617 alloy under impact deformation, and its plasticity in casted and forged states during precipitation on the pile driver and on the eccentric press was determined. (Author)

AD-292 211 Div. 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHASE COMPOSITION OF OXIDES OF NIOBIUM BASE ALLOYS,
by G. V. Estulin, T. V. Yegorshina and N. N. Burova. 30 Oct 62, 9p. incl. illus. tables, 11 refs. (Trans. no. FTD-TT-62-1297 from Fizika Metallov i Metallovedeniye 13:4, pp. 550-554, 1962)
Unclassified report

DESCRIPTORS: *Niobium alloys, *Oxides, *Phase studies, Niobium, Titanium, Vanadium, Chromium, Molybdenum, Tungsten, Zirconium, Alloys, Metals, Crystal structure, Oxidation, Scale, Additives, Lattices, USSR.

The phase composition of oxides of pure Nb and Nb-Ti, V, Cr, Mo, W, and Zr alloys has been investigated. A study of the structure and composition of oxide phases, forming during high temperature oxidation of Nb alloys, offers the possibility not only to explain the mechanism of the effect of alloying admixtures on the oxidizability of Nb, but also to notice more effective ways of increasing the scaling resistance of Nb alloys. (Author)

AD-292 212 Div. 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF CONCENTRATING ORE AND OTHER MATERIALS AND AN INSTALLATION FOR ITS ACCOMPLISHMENT,
by L. A. Yutkin and L. I. Gol'tsova. 30 Oct 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1294 from Patent 113549, Application no. 9949, 575050/1h. 6, pp. 1-2, May 55)
Unclassified report

DESCRIPTORS: *Ores, *Materials, Test methods, Electric discharges, Conductivity, Particles, Conductors, Test equipment, Hydraulic systems, Colloids, USSR, Separation.

The proposed method of concentrating ore permits the division of current-conducting particles from the nonconducting and transfers them to a suspended, colloid state. The ore is subjected to the action of electrical pulse discharges in a liquid medium, which creates electro-hydraulic shocks and destroys the current-conducting part of the starting material. (Author)

AD-292 223 Div. 17, 26
(TISTM/TCG) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TECHNOLOGY OF MACHINE CONSTRUCTION (SELECTED ARTICLES).
7 Nov 62, 24p. incl. illus. tables, 11 refs. (Trans. no. FTD-TT-62-1248 from Tekhnologiya Mashinostroyeniya, Kuybyshev Aviatsionnyy Institut., pp. 61-79, 1960)
Unclassified report

DESCRIPTORS: *Alloys, *Steel, *Grinders, Heat treatment, *Heat resistant alloys, Spark machining, Electroerosive machining, Nickel alloys, Hardness, Electrodes, Brass, Aluminum alloys, Iron alloys, Pulse generators, USSR, Machining.

Contents:
Investigating the depth of the cold-hardened layer obtainable in grinding
Investigation of some technological characteristics of electric spark working of heat-resistant alloys on a nickel base

AD-292 239 Div. 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEFORMATION DIAGRAM OF STEEL HARDENED FROM TEMPERATURE Ac1-Ac3,
by G. IL Pogodin-Alekseyev and B. A. Artamonov. 31 Oct 62, 9p. incl. illus. table, 4 refs. (Trans. no. FTD-TT-62-1299 from Metallovedeniya i Termicheskaya Obrabotka Metallov, no. 3, pp. 47-51, 1961)
Unclassified report

DESCRIPTORS: *Steel, *Hardening, *Deformation, Crystallization, Dynamics, Loading, Stresses, Heat treatment, Hardness, Plasticity, Impact shock, Elasticity, Tensile properties, Phase studies, Mechanical properties.

Investigation was made of the dynamic and static strength of steel after hardening from the most characteristic temperatures of the recrystallization A sub C1 to A sub C3. Normalized steel billets were prepared. No incisions were made, in order to create during loading a volumetric stressed state, and also to prevent high relative error in measuring the mechanical properties. (Author)

AD-292 240 Div. 17
(TISTM/RGR) OTS price $8.10

Republic Aviation Corp., Farmingdale, N. Y.
IMPROVED METHODS FOR THE PRODUCTION OF TITANIUM ALLOY EXTRUSIONS.
Interim technical engineering rept. no. 22, 1 Sep-1 Dec 62,
by Murray H. Levine. Dec 62, 84p. incl. illus. tables.
(Contract AF 33(600)34098, Proj. 7-556)
(ASD TR 7-556, Vol. 22) Unclassified report

DESCRIPTORS: *Titanium alloys, *Extrusion, *Drawing, Aluminum alloys, Molybdenum alloys, Vanadium alloys, Dies, Glass textiles, Lubricants, Composite materials, Aluminum compounds, Oxides, Tungsten compounds, Carbides, Laboratory furnaces.

The most significant conclusion of the over-all extrusion program has been the successful completion of the extrusion phase in terms of extruding 20 feet lengths of 1/16 inch cross

section tee shapes in 7Al-4Mo, 6Al-4V and 4Al-3Mo-IV titanium alloys. The success of this program can be attributed to the following conditions: alumina-coated dies, improved billet preparation, and composite glass wool/granular glass die pad lubricant. Further studies in terms of glass wool behavior during this quarter indicate that the best overall extruded qualities in terms of die fill and surface smoothness are obtained when high viscosity glasses in fiber form are used as part of the composite die pad lubricant. Successful pre-heating, gripping and warm drawing of extruded 1/16 inch tee shapes to thinner sections have been realized utilizing the newly constructed resistance heated muffle tube furnace, and the Hufford Universal Jaw grips. Redesign of the tungsten carbide draw dies to extend the orifice of the tungsten carbide draw dies to increase the vertical and horizontal leg dimension will permit final reduction of the above shapes to a .040 inch cross section. (Author)

AD-292 244 Div. 17
(TISTM/RGR) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
PILOT EVALUATION OF VANADIUM ALLOYS.
Bimonthly rept. no. 7, 18 Sep-17 Nov 62,
by B. R. Rajala and F. G. Holtz. 14 Dec 62,
25p. incl. tables (Rept. no. B231-7)
(Contract NOw 62-0101-c)
Unclassified report

DESCRIPTORS: *Vanadium alloys, *Tensile properties, Niobium alloys, Titanium alloys, Tantalum alloys, Tungsten alloys, Zirconium alloys, Hafnium alloys, Carbon, Nitrogen, Oxygen, Sheets, Processing, Manufacturing methods, Alloys.

Vanadium-niobium alloys prepared as 200-gram arc-melted ingots were evaluated for fabricability and tensile properties to 2400 F. Of the high-vanadium compositions, the strongest was V-5 wt-%, Ti-20 wt-%, Nb-10 wt-%, Ta which had strength values of 54,000 and 15,700 psi at 2000 and 2400 F, respectively. Tensile values of the stronger alloys at the 60 wt-% Nb levels were near 65,000 psi at 2000 F and near 20,000 psi at 2400 F. Strengthening of the V-Nb alloy bases was accomplished by addition of refractory metals (Ta, W), the reactive metals (Ti, Zr, Hf), and the interstitials (C, O, N). Material from the first 100-pound double consumable-electrode arc-melted ingot, a V-1 wt-%, Ti-60 wt-%, Nb composition, was distributed to the organizations participating in the data exchange program. A second 100-pound ingot, V-4 wt-%, Ti-20 wt-%, Nb-1 wt-%, Ti-0.75 wt-%, C, was triple-melted and forwarded to a commercial source for extrusion and subsequent fabrication to bar, plate, and sheet. (Author)

AD-292 250 Div. 17
(TISTM/SJR) OTS price $11.00

Climax Molybdenum Co. of Michigan, Detroit.
ARC-CAST MOLYBDENUM-AND TUNGSTEN-BASE ALLOYS (1960-1961),
by M. Semchyshen, R. Q. Barr and E. Kalns.
Nov 62, 141p. incl. illus. tables, 9 refs.
(Contract Nonr-239000, Proj. NR 039-002)
Unclassified report

DESCRIPTORS: *Tungsten alloys, *Molybdenum alloys, *Refractory materials, *Mechanical properties, Castings, Forging, Sheets, Extrusion, Melting, Electron beams, Niobium, Titanium, Zirconium alloys, Hafnium, Carbides, Boron, Metallic crystals, Grains, Manufacturing methods, Alloys.

The progress of work aimed at explaining the strengthening mechanisms operative in several molybdenum-base alloys is described. The optimum carbon contents for conventionally processed molybdenum-base alloys containing titanium, hafnium, zirconium, and titanium + zirconium are defined. The possibilities of increasing the strengths and reducing the optimum carbon content of these materials through solution and aging heat treatments are discussed. Attempts to prepare wrought sections of molybdenum-base alloys containing nominally 10% Cb and/or 10% Ta were only marginally successful owing to difficulties encountered in working the vacuum-arc-cast ingots. A series of experiments is described wherein various melting and deoxidation practices are evaluated in connection with the 50% Mo-50% W alloy. Alloys based on tungsten or on various molybdenum-tungsten ratios have received considerable attention. Considerable difficulty was encountered in converting certain of the alloys of this type to bar stock. Outstanding elevated-temperature tensile and stress-rupture properties are reported for a number of the compositions that were successfully converted to wrought stock. (Author)

AD-292 259 Div. 17
(TISTM/SJR) OTS price $4.60

General Dynamics/Fort Worth, Tex.
MATERIALS. ALCLAD 2024 ALUMINUM ALLOY. SHORT TIME ELEVATED TEMPERATURE MECHANICAL PROPERTIES. DETERMINATION OF,
by P. F. Ghena. 31 Oct 57, 47p. incl. illus. tables (Rept. no. FGT-1773)
(Contracts AF 33(038)21250 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Stresses, *Tensile properties, Mechanical properties, Heat.

Three tempers of 0.081 inch aluminum alloy sheet were tested in tension and two tempers were tested in compression at elevated temperatures after being heated rapidly to test temperature. The results of this test are presented as empirical data on single lots of material for the purpose of establishing design allowables for rapid heating and short time exposures to elevated temperatures. (Author)

AD-292 269 Div. 17, 30
(TISTM/TCG) OTS price $.75

Metals and Ceramics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
AGING STUDY OF 2024 ALUMINUM BY DYNAMIC MODULUS TECHNIQUES.
Final rept. for Apr 61-June 62 on The Chemistry and Physics of Materials,
by G. W. King. Nov 62, 16p. incl. illus. table, 14 refs.
(AF Proj. 7360)
(ASD TDR 62-829) Unclassified report

DESCRIPTORS: *Aluminum alloys, Dynamics, Test methods, Phase studies, Stresses, Elasticity, Mechanical properties, Molecular association, Non-destructive testing, Precipitation, Piezoelectric transducers, Aging.

Dynamic modulus measurements are used to study precipitation rates in 2024 Al alloy. The results are discussed in terms of the effect of structural changes on the elastic modulus as well as the kinetics of precipitation at various stages of the age-hardening process. Activation energies were determined for aging in the temperature ranges from room (77 F) to 130 F, and 375 F to 425 F. A value of 20.7 kcal/gm mole was

obtained for the lower temperature range, and 23 kcal/gm mole for the higher temperatures. The data indicate that modulus changes are primarily influenced by the structure of the second phase, however, some evidence of strain energy effects are indicated. (Author)

AD-292 270 Div. 17
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - SAE 4335 (MODIFIED) - STEEL PROCESS CONTROL AND MECHANICAL PROPERTIES - DEVELOPMENT OF.
Final rept.,
by R. C. Whiting. 9 Nov 62, 17p. incl. illus. tables (Rept. no. FGT-1659)
(Contracts AF 33(038)21250 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Steel, Mechanical properties, Fatigue (Mechanics), Tensile properties, Processing, Manufacturing methods, Stresses, Alloys, Heat treatment.

A study was made to investigate the reliability of SAE 4335 (modified) for applications in the 260-292 ksi heat treat range. Tests were made to determine the mechanical properties of uni-welded joints, and the axial fatigue properties of SAE 4335 (modified) steel heat treated to 260-292 ksi. The tensile strength of a uni-weld joint in SAE 4335 (modified) steel was determined. (Author)

AD-292 271 Div. 17
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - SPECIAL 2024 T86 ALUMINUM - MECHANICAL AND CORROSIVE PROPERTIES - DETERMINATION OF,
by S. V. Glorioso. 6 Nov 62, 11p. incl. illus. tables (Rept. no. FGT-1656)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Sheets, Tensile properties, Elasticity, Stresses, Thickness, Deformation, Corrosive liquids, Sea water, Mechanical properties, Corrosion.

The tensile properties of 2024-T86 Al alloy sheet material with cladding thicknesses of 2-1/2% of total thicknesses on both faces and 2-1/2% on one face and 1-1/2% of total thickness on the opposite face were determined for the as received condition and after dynamic etching to various thicknesses. The change in properties due to dynamic etching and salt spray tests is given. (Author)

AD-292 280 Div. 17, 26
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
EFFECT OF HEAT TREATING VARIABLES AND ELEVATED TEMPERATURES ON THE MECHANICAL PROPERTIES OF HIGH OXYGEN 6Al-4V TITANIUM ALLOY.
Report on Material - Titanium Alloy - Ti 6Al-4V - High Oxygen Content. Effect of Heat Treating Variables and Elevated Temperatures on Mechanical Properties,
by A. Giuntoli, P. Bergstedt, and H. C. Turner. 18 Sep 58, 9p. incl. illus. tables, 1 ref. (Rept. no. 57-682)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Titanium alloys, Aluminum alloys, Heat treatment, High temperature research, Oxygen, Stability, Stresses, Vanadium alloys, Aging, Elasticity, Tensile properties, Tests, Mechanical properties.

The effect of 25 F variation in solution heat treatment and 20 F variation in aging temperatures upon the mechanical properties of a 0.20 to 0.25% oxygen Ti 6Al-4V heat were determined. As a result of tests yield and ultimate strength variations between 164.2 to 176.1 ksi and 176.4 to 191.0 ksi, respectively, with no significant variation in ductility was found. Elevated temperature mechanical properties tests showed that the room temperature strength advantage found in the high oxygen Ti 6Al-4V diminished as temperatures rose to 750 F where the advantages began to disappear. Stress stability tests conducted at 750 for 1000 hours in the presence of 50 ksi stress indicated the high oxygen Ti 6Al-4V to be stable under these conditions. (Author)

AD-292 283 Div. 17, 26
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
TESTS OF X2020-T6 ALUMINUM ALLOY SHEET AT ELEVATED TEMPERATURES.
Report on Materials - Aluminum Alloy - X2020-T6 Elevated Temperature Mechanical Properties,
by P. W. Bergstedt. 25 July 58, 7p. incl. illus. tables, 1 ref. (Rept. no. MP-58-078)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Aluminum alloys, Heat treatment, High temperature research, Exposure, Sea water, Salts, Sprays, Tensile properties, Stresses, Sheets, Shear stresses, Bearings, Elasticity, Tests, Mechanical properties.

Aluminum alloy X2020-T6 sheet 0.064 inch thick was tested at room temperature, 300, 400, and 500 F after 1/2, 10 and 100 hours and at room temperature after the several elevated temperature exposures to determine mechanical properties of design interest. The room temperature and elevated temperature properties found after 100 hours exposure to the various temperatures are tabulated to indicate the trends occasioned by temperature increases. Room temperature properties found after heating are also tabulated to indicate strength and ductility reductions occasioned by heating. Salt spray exposures of 250 hours were applied to material heated at 300, 400, and 500 F for 100 hours, and as a result no significant strength reductions resulted; however, the ductility was severely reduced by salt spray corrosion by 18 to 53% of the initial value. (Author)

AD-292 284 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
COMPARISON OF STRESS-CORROSION RESISTANCE OF BARE X2020-T6 SHEET AND BARE 7075-T6 SHEET.
Report on Materials - Aluminum Alloy - X2020-T6, 7075-T6 Stress Corrosion Cracking Resistance,
by H. H. Stier. 16 Dec 58, 2p. 1 ref.
(Addendum no. 1 to rept. no. MP 58-078)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Aluminum alloys, *Corrosion, Mechanical properties, Tensile properties, Salts, Sea water, Sprays, Exposure, Sheets, Fracture (Mechanics), Beams, Stresses.

End supported, centrally loaded, 0.063 in. x 1 in. x 9 in. beams of X2020 and 7075-T6 aluminum alloy sheet, held in an insulated clamping fixture, were stressed to 80% of their tensile yield strength and exposed to salt spray atmosphere for 250 hours. At the end of the salt spray exposure no stress corrosion cracking was observed either in the X2020-T6 or 7075-T6 alloy. During the salt spray corrosion exposure the X2020-T6 alloy pitted severely at the frequency of three to six 1/8 in. diameter by 1/16 in. deep pits per square inch. The 7075-T6 material did not pit as a result of salt spray corrosion exposure. (Author)

AD-292 290 Div. 17
(TISTM/REB) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
HYDROGEN RELIEF OF ELECTRO-PLATED HOT-WORK DIE STEELS.
Report on Materials - Finishes and Coatings - Watts Nickel Plate and Chromic-Sulfuric Acid Chromium Plate on H-11 Hot Work Die Steel Hydrogen Embrittlement,
by P. W. Bergstedt. 16 Mar 59, 4p. incl. table, 1 ref. (Rept. no. MP 58-123)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Hydrogen embrittlement, *Steel, *Nickel plating, *Chromium plating, Chromic acid, Sulfuric acid, Electroplating.

Annealed 3/4 inch diameter Vascojet 1000 (H-11 Hot Work Die Steel) was machined into 0.020 and 0.030 in.-diam oversize 0.505 diam by 2 in. gage length test bars. These bars were pre-heated for 20 to 30 minutes at 1450 F, austenitized for 1 hour at 1850, air cooled, tempered for 2 hr at 1050 F, air-cooled, retempered at 1050 F for 2 hr, air cooled and then turned to 0.505 in. of Ni in a Watts Ni plating bath. After plating, duplicate test specimens were tested at room temperature after baking treatments at 400, 600, 800 and 1000 F for 1 to 12 hr. Ten test bars were plated with 0.005 in. of Cr in a chromic sulfuric acid chromium plating bath. After plating, 8 test bars were baked at 1000 F for periods in the range of 1 to 4 hr. Negligible change in the ductility of the heat treated Vascojet 1000 steel was observed as a result of nickel plating. In contrast, plating in a chromic-sulfuric acid Cr plating bath resulted in drastic reductions in the elongation (45% less) and reduction of area (72% loss) of the Vascojet 1000 steel. Only baking at 1000 F for 4 hr served to extensively relieve the plating embrittlement. Under these conditions 92% of the original elongation and 93.5% of the original reduction of area was restored. (Author)

AD-292 294 Div. 17, 26
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MONEL RIVETS IN BARE 7178-T6 SHEET.
Report on Materials - Nickel Base Alloys - Monel Metal Shear Strengths,
by H. H. Stier. 14 Oct 58, 5p. incl. illus. tables, 1 ref. (Rept. no. MP 58-235)
(Contracts AF 33(600)30169 and AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Nickel alloys, *Rivets, Wire, Steel, Aluminum alloys, Shear stresses, Sheets, Tests, Mechanical properties.

The simple ultimate shear strength of 1/8 inch and 5/32 inch diameter Monel Metal rivet wire was determined with steel shear jigs and found to be 55,000 and 56,900 psi respectively. In addition, universal and 100 degree countersunk head rivets were driven in 7178-T6 aluminum alloy and the ultimate and yield (0.005 inch offset) strength of the combinations were determined. The rivet test specimen consisted of 2 rivets in tandem, spaced 4 rivet diameters apart, maintained at 2 diameters edge distance, and driven to head diameters 1.5 times the rivet shank diameters. The results of the riveted joint tests are presented in tabular form. (Author)

AD-292 313 Div. 17, 25
(TISTM/TCS) OTS price $2.60

Watertown Arsenal Labs., Mass.
A STUDY OF CYLINDRICAL IMPACT SPECIMENS.
Technical rept. on Perfection of Inspection Techniques for Mechanical Properties of Ordnance Materials. Industrial Preparedness Measures,
by Norbert H. Fahey. Nov 62, 20p. incl. illus. 9 refs. (Technical rept. no. WAL TR 112.5/5)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Impact shock, Transition temperatures, Energy, Fracture (Mechanics), Sensitivity, Temperature, Hardness, Stresses, Fibers, Steel, Test equipment, Test methods, Elasticity.

The standard Charpy impact specimen with its close dimensional tolerances is expensive and time-consuming to machine. The feasibility is determined of using a more economical test specimen. Because of the ease of fabrication, concentrically V-notched round specimens were used and tests were conducted over a range of temperatures. For the limited range of sizes investigated the transition temperatures determined with cylindrical specimens are independent of size and are in close agreement with those of standard square specimens. Whereas considerable difficulty was experienced in attempts to relate energy values from variously sized square specimens, correlations appear simple in cylindrical specimens through relationships of energy and fracture appearance. It is also shown that subsize cylindrical specimens were more sensitive to testing temperatures within the transition range. This investigation indicates that results derived from concentrically notched round impact specimens are quite informative and merit consideration. (Author)

AD-292 603 Div. 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEPENDENCE OF MECHANICAL PROPERTIES OF EUTECTOID STEEL UPON THE STRUCTURAL STATE OF PERLITE,
by K. I. Tushinskaya and L. I. Tushinskiy.
7 Nov 62, 6p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-1348 from Izvestiya VUZ, Chernaya Metallurgiya, no. 12, pp. 130-134, 1961)
Unclassified report

DESCRIPTORS: *Steel, *Pearlite, Austenite, Microstructure, Grains (Metallurgy), Heat treatment, Hardness, Tensile properties, Growth, Crystallization, Eutectics, USSR, Mechanical properties.

Research was conducted to establish the dependence of mechanical properties upon the structural state of perlite of eutectoid steel. Species (of gagarin type) to determine strength characteristics and standard types with Menage notching for testing impact strength were made from C eutectoidal U8A steel. To obtain a different

dimension of austenitic and perlite grain, the species were placed in a quartz tube and annealed in vacuum at temperatures above point A sub c3, namely, 850, 950, 1050, 1150 degrees. (Author)

AD-292 612 Div. 17
(TISTM/TCG) OTS price $2.60

Foreign Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INFLUENCE OF MOLD WALL THICKNESS ON THE QUALITY OF INGOTS CAST FROM NICKEL-BASED ALLOYS,
by S. A. Iodkovskiy, V. K. Novitskiy and others.
8 Nov 62, 24p. incl. illus. tables (Trans. no. FTD-TT-62-1241 from Slitok I Svoystva Stali, Konferentsiya po Fiziko-Khimicheskim Osnovam Proizvodstva Stali, 5th Trudy Konferentsii, Moskva, pp. 47-60, 1961)
Unclassified report

DESCRIPTORS: *Nickel alloys, *Castings, *Heat resistant alloys, Thickness, Density, Melting, Gases, Molding, Fracture (Mechanics), Ultrasonics, Non-destructive testing, Processing, Manufacturing methods, USSR, Casting.

A detailed investigation of the quality of 500 kg ingots cast from a heat-resistant, high-alloy Ni alloy established that there was virtually no liquation of elements in the body of the ingot and that the density of the metal, with the exception of defect zones, was 8.58 g/cc, uniformly. A large number of internal longitudinal and transverse cracks located along the grain boundaries were discovered when the macrostructure in the axial zone of the ingot was studied. A study was made of the causes for the appearance of internal cracks in ingots cast from a Ni alloy and methods for preventing these cracks were investigated. (Author)

AD-292 617 Div. 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STUDYING THE EFFECT OF PROCESS ANNEALING ON THE STRUCTURE AND PROPERTIES OF CASTED TUNGSTEN,
by M. I. Gavrilyuk, I. N. Chaporova and others.
28 Nov 62, 12p. incl. illus. 16 refs. (Trans. no. FTD-TT-62-1243 from Fizika Metallov i Metallovendeniye, 13:5, pp. 693-700, 1962)
Unclassified report

DESCRIPTORS: *Tungsten, *Castings, Crystal structure, Mechanical properties, Deformation, Microstructure, Fracture (Mechanics), Crystallization, Brittle materials, Grains (Metallurgy), Thickness, USSR, Heat treatment.

The effect of annealing temperature on the mechanical properties, microstructure and structure of cast W fractures was investigated. The absence of formation of foreign phases on the boundaries of grain of recrystallized (processed) metal was established. It has been assumed that brittleness of W and metals analogous to it in recrystallized state is connected with the phenomenon of intercrystallite internal adsorption of admixtures. (Author)

AD-292 635 Div. 17
(TISTM/SJR) OTS price $7.60

Bell Aerosystems Co., Buffalo, N. Y.
COMPILATION OF SELECTED BELL AEROSYSTEMS COMPANY TEST REPORTS ON THE PHYSICAL PROPERTIES OF ALUMINUM ALLOYS,
by John M. Nowak. Dec 62, 62p. incl. illus. tables (Rept. no. BLR 62-17M)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Aluminum alloys, Mechanical properties, High temperature research, Welded joints, Magnesium alloys, Silicon alloys, Physical properties.

AD-292 653 Div. 17, 26
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF OBTAINING METALLIC TITANIUM,
by N. N. Dolgopolov, G. I. Babat and others.
30 Oct 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1292 from Patent No. 113474, Appl. No. 10615/575521/40a, 4650, pp. 1-3, 3 Feb 1955)
Unclassified report

DESCRIPTORS: *Titanium, *Metallic compounds, Synthesis, Oxides, Chlorides, Decomposition, Melting, Vacuum systems, High frequency, Electric discharges, Laboratory equipment, USSR, Production.

A method of obtaining metallic Ti from its oxides or chlorides is distinguished by the fact that, for the purpose of accomplishing a continuous process, simplifying technology and decreasing power expenses, the decomposition of Ti compounds is accomplished by the reaction of an electrode-less, high-frequency, electrical discharge at normal pressure, in an atmosphere of reactive gaseous matter, the supply and removal of which is accomplished continuously. (Author)

AD-292 662 Div. 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTROHYDRAULIC EFFECT AND ITS APPLICATION IN MINING,
by L. Yutkin. 7 Nov 62, 8p. (Trans. no. FTD-TT-62-1347 from Stroitel'nyye Materialy, Izdaliya i Konstruktsii, No. 9, pp. 13-15, 1955)
Unclassified report

DESCRIPTORS: *Mining engineering, *Electric discharges, *Hydraulic fluids, Hydraulic presses, Hydraulic pressure pumps, Crusher gages, USSR.

The electrohydraulic effect - a phenomenon originating during electric piercing of a liquid with a high voltage pulsed discharge, having a circular front and short life span (duration). Transformation of electric energy into mechanical is realized without the aid of any special devices and with sufficiently high efficiency. It appears to be a technical method of obtaining high and ultrahigh hydraulic pressures and can be well utilized in various fields of science and technology. (Author)

AD-292 700 Div. 17, 31
(TISTM/TCG) OTS price $1.25

Committee on Ship Structure, National Research Council, Washington, D. C.
INVESTIGATION OF THE NOTCH-TOUGHNESS PROPERTIES OF ABS SHIP PLATE STEELS,
Final rept. on Proj. SR-125,
by J. J. Gabriel and E. A. Imbembo. 1 Oct 62, 35p. incl. illus. tables, 12 refs. (Serial no. SSC-142)
(Contract NObs-84321, Proj. NS-011-078)
Unclassified report

DESCRIPTORS: *Steel, *Sheets, *Ship plates, Hardness, Thickness, Tensile properties, Grains (Metallurgy), Crystal structure, Transition temperature, Fracture (Mechanics), Chemical analysis, Specifications, Mechanical properties.

SR-125 was initiated for the purpose of surveying notch-toughness properties of ship plate procured by various shipyards for merchant ship construction under ABS rules. The main objective was to determine the extent to which post World War II steels have been improved, based principally on a comparison of their Charpy V-notch properties with those established by the National Bureau of Standards for fractured plates from World War II ships. The initial part of the program (prior to 1956) covered plate procured to the requirements of the 1948 ABS Rules and included 37 samples of Class A, 81 of Class B and 14 of Class C. The results of the survey indicate that since the 1956 revision of the ABS Rules for Ship Steel, the range and average transition temperatures (15 ft-lb Charpy V) for the new material have been found to be -40 to 29 F and 2 F, respectively, for ABS Class B plates, and -46 to 13 F and -13 F, respectively, for ABS Class C plates, as compared with an average of 90 F for World War II fracture-source plates and 68 F for fracture-through plates. (Author)

AD-292 703 Div. 17
(TISTM/SJR) OTS price $1.50

Armour Research Foundation, Chicago, Ill.
THE EFFECT OF ADDITION ELEMENTS ON THE RATE OF BETA GRAIN GROWTH IN ALPHA-BETA AND BETA TITANIUM ALLOYS.
Final rept., Feb 61-Mar 62 on Metallic Materials, by F. A. Crossley. Nov 62, 52p. incl. illus. tables, 15 refs. (Rept. no. ARF 2213-14)
(Contract AF 33(616)7687, Proj. 7351)
(ASD TDR 62-520) Unclassified report

DESCRIPTORS: *Titanium alloys, *Manufacturing methods, Aluminum alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Barium, Strontium, Boron, Hafnium, Silver, Sulfur, Tensile properties, Grains, Metallurgy.

The inhibition of beta grain growth in titanium alloys was investigated. The principal means investigated was the addition of minor amounts of solutes. Grain growth inhibition was expected to result from the preferential adsorption of the additions on the grain boundary and the consequent lowering of the grain boundary energy. Solutes were selected on two bases: (1) experimental indication of effectiveness as reported in the literature, and (2) anticipated high degree of polarizability. Solutes of high polarizability were expected to be relatively more effective in lowering the grain boundary energy because of the ease by which their outer electronic field can be distorted. The study involved three base compositions: unalloyed titanium, B-120VCA (Ti-13V-11Cr-3Al), and Ti-8Al-1Mo-1V alloy. Additions selected for high polarizability were barium and strontium. Other additions evaluated were boron, sulfur, and silver plus hafnium. The sulfur and boron additions produced particulate phases in the alloys. Only additions of sulfur or boron inhibited beta grain growth in titanium and Ti-8Al-1Mo-1V alloy. However, in B-120VCA barium was only slightly less effective in inhibiting grain growth than sulfur or boron. Room temperature tensile properties gave no indications of detriment to mechanical properties due to any of the additions. Strontium appeared to be beneficial to ductility through a scavenging action. (Author)

AD-292 798 Div. 17, 25
(TISTM/EJH) OTS price $2.60

Stanford U., Calif.
ELASTIC PROPERTIES RESEARCH.
Progress rept. no. 6, 1 Apr-30 Sep 62, by K. T. Kamber, A. J. Ardell and others. 30 Sep 62, 10p. incl. illus. 12 refs.
(Contract AF 33(616)6789)
Unclassified report

DESCRIPTORS: *Elasticity, *Plasticity, *Ferromagnetic materials, *Metals, Ferromagnetism, Copper, Cobalt, Nickel, Crystals, Deformation, Creep, Theory, High temperature research, Mathematical analysis, Mechanical properties.

Contents:
Influence of grain boundary relaxation on the elastic properties of polycrystalline aggregates
Modulus compensated activation energy for creep
Elastic and plastic properties of pure polycrystalline copper
The effect of ferromagnetism on the elastic and plastic properties of iron, cobalt and nickel

AD-292 902 Div. 17
(TISTM/ODN) OTS price $3.60

Thompson Ramo Wooldridge, Inc. Cleveland, Ohio.
FRACTURE CHARACTERISTICS OF STRUCTURAL METALS.
Quarterly rept. no. 2, 1 Oct-31 Dec 62, by G. L. Hanna and E. A. Steigerwald. 31 Dec 62, 30p. incl. illus. tables, 6 refs. (Rept. no. TM3569-67)
(Contract N600(19)58831)
Unclassified report

DESCRIPTORS: *Steel, Tensile properties, Fracture (Mechanics), Alloys, Cobalt alloys, Nickel alloys, Titanium alloys, Carbon alloys, Structures, Molybdenum alloys, Heat treatment, Sheets, Bibliography, Microstructure, Mechanical properties.

Results are obtained from smooth and notch tensile tests conducted on the 18% Ni maraging steels. A significant difference in smooth strength properties existed between two heats of the 250,000 psi grade of maraging steel (7% Co). This difference in strength could be correlated to differences in C and Ti content. Plane strain fracture toughness values determined by resistance measurements for one heat of the 7% Co steel over test temperatures ranging from -100 to 300 F indicated that this parameter varied from approximately 150,000 to 130,000 psi-in. to the 1/2 power. Plane strain fracture toughness determined for two heats of 9% Co maraging steel in sheet form (300,000 psi grade) indicated very little variation as a function of test temperature in the -100 to 300 F range. Heat 1 had a mean value of 116,000 psi-in. to the 1/2 power with a standard deviation of 3150 psi-in. to the 1/2 power while heat 2 had a mean value of 110,000 psi-in. to the 1/2 power with a standard deviation of 7130 psi-in. to the 1/2 power. (Author)

AD-292 976 Div. 17, 25
(TISTM/EJH) OTS price $3.60

Pennsylvania U. School of Metallurgical Engineering, Philadelphia.
ON THE ORIGIN OF DEFORMATION BANDS.
Master's thesis, by D. Wilsdorf and Robert Guyard. 1959, 23p. illus.
(Contract AF 49(638)435)
Unclassified report

DESCRIPTORS: *Deformation, *Aluminum, *Single crystals, Crystals, Lattices, Stresses, Preparation, Manufacturing methods, Test methods, Mathematical analysis, Nucleation.

Though deformation bands have been investigated for many years their origin is not yet well understood. The purpose of the present work was to develop and apply techniques for the study of the relation between accidental bendings and the nucleation of deformation bands. Techniques of producing and straining wavy crystals of aluminum and of introducing bending stresses while pulling are reported. (Author)

AD-293 096 Div. 17, 26
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
PROPERTIES OF WELDED AND RIVETED JOINTS.
Rept. on Material - Nickel Base Alloy - Hastelloy R235 and Haynes Alloy No. 25,
by G. J. Langford and H. C. Turner. 12 Jan 59, 8p. incl. illus. tables (Rept. no. 8926-004)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Welded joints, *Riveted joints, *Nickel alloys, Tensile properties, Heat treatment, Spot welds, Rivets, Shear stresses, Mechanical properties, Elasticity, Welding, Thickness, Fracture (Mechanics).

The room temperature weld joint efficiency of 10% cold worked Hastelloy R235 to R235 fusion welded joints in .016 and .040 inch thick material was about 90%. Slight strengthening and loss of ductility occurred at -100 F. Strength losses of 20% in .016 inch thick and 60% in .040 inch thick material occurred at 1500 F. Severe embrittlement took place in welds heated at 1500 F. Fusion welded butt joints of 10% cold worked Hastelloy R235 to Haynes Alloy No. 25 were stronger and more ductile at room temperature, -100 F and 1500 F than 10% cold worked Hastelloy R235 to R235 joints. Spot welded joints in .020 to .020 and .020 to .040 inch thick 10% cold worked Hastelloy exceeded Mil-W-6858 requirements at room temperature, but .020 to .063 inch thick 10% cold worked Hastelloy R235 did not. Spot welded-joints of 10% cold worked Hastelloy R235 and Haynes Alloy No. 25 exceeded Mil-W-6858 requirements for strength at -100 F, room temperature and 1500 F although nugget configurations were not satisfactory. (Author)

AD-293 097 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
BAUSCHINGER EFFECTS.
Report on Material - Nickel Base Alloy - Hastelloy R-235,
by A. Giuntoli, P. W. Bergstedt, and H. C. Turner. 1 Dec 58, 7p. incl. illus. table (Rept. no. 8926-005)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Nickel alloys, Tensile properties, Heat treatment, Elasticity, Deformation, Mechanical properties.

Ten per cent cold worked Hastelloy R-235 as received from the producer averaged 26.2% lower in compression yield strength than in tensile yield strength. Stretching this material to 1% elongation results in a most severe lowering of compression yield strength to 31.2% below the as received tensile strength. Post stretching heat treatment at 1500 F for 2 hours restores equality of tensile and compressive yield strengths. The material displayed uniform elongation when stretched up to 9% elongation. (Author)

AD-293 098 Div. 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF VARIOUS CONVENTIONAL HEAT TREATMENTS ON STRESS CORROSION RESISTANCE.
Report on Material - Stainless Steel - Armco 17-7 PH,
by H. Stier, P. W. Bergstedt, and H. C. Turner. 29 Apr 59, 10p. incl. illus. table (Rept. no. 8926-001)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Stainless steel, *Corrosion, Sheets, Heat treatment, Manufacturing methods, Hardening, Sprays, Salts, Sea water, Sandblasting, Fracture (Mechanics), Failure (Mechanics), Elasticity, Hardness, Chemical analysis, Mechanical properties, Stresses.

The stress corrosion resistance of 0.032 and 0.040 inch thick Armco 17-7 PH stainless steel sheet was evaluated under a stress of 0.8 of the guaranteed 150,000 psi minimum yield strength in the presence of Federal Standard No. 151A salt spray atmosphere. Material conditioned by RH-1050, TH-1050 and RH-950 heat treatments and strains representative of fabricating steps were examined. Material treated by RH-1050, TH-1050 and RH-950 heat treatments possessed stress corrosion susceptibility inversely related to hardening temperature. Double hardening treatments reduced the stress corrosion susceptibility but reduced strengths below specified values. (Author)

AD-293 100 Div. 17, 26
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
EFFECT OF 1500 DEGREES F EXPOSURES ON THE MECHANICAL PROPERTIES OF 10 PER CENT COLD WORKED HASTELLOY R235.
Report on Material-Nickel Base Alloy-Hastelloy R235,
by A. Guintoli, P. W. Bergstedt and H. C. Turner. 22 Sep 58, 4p. incl. illus. table (Rept. no. 8926-003)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Nickel alloys, *Heat resistant alloys, Tensile properties, Aging, Sheets, Elasticity, Deformation, Mechanical properties, Heat treatment.

Longitudinal strips of 10% cold worked Hastelloy R-235 nickel base alloy were exposed to 1500 F for 10, 30, 50, 70 and 100 hour periods in an air furnace. After exposure the strips were prepared and tension tested at room temperature. The mechanical properties versus exposure time at 1500 F showed that the material underwent aging during exposure. The aging peak was reached at some time prior to 10 hours at 1500 F. Over aging effects were observed at all exposure times greater than 10 hours. (Author)

AD-293 105 Div. 17
(TISTM/RGR) OTS price $4.60

Battelle Memorial Inst., Columbus, Ohio.
EFFECT OF ELECTRON CONCENTRATION ON MECHANICAL

PROPERTIES OF ALLOYS OF REFRACTORY METALS.
Annual topical rept.,
by Ervin E. Underwood. 28 Dec 62, 42p. incl. illus. tables.
(Contract Nonr-358900)
Unclassified report

DESCRIPTORS: *Electrical properties, *Rhenium alloys, *Chromium alloys, Molybdenum alloys, Tungsten alloys, Crystal structure, Deformation, Thin films, Mechanical properties, Resistance, Alloys.

Segregation to grain boundaries in rhenium alloys with Group VI-A metals is studied. The three methods used to study segregation were: microhardness traverse across the microstructure, X-ray diffraction, and autoradiography. Evidence of rhenium segregation to grain boundaries and twin interfaces is clear. Twinning in chromium-rhenium and molybdenum-rhenium alloys is described. The appearance of deformation twins in thin films of these alloys is reported. The electrical resistance of the alloys in various annealed states and over a range of temperatures is described and related to mechanical properties (51 references).

AD-293 158 Div. 17
(TISTM/SJR) OTS price $1.60

Colorado School of Mines, Golden.
IMPROVED OXIDATION RESISTANCE OF MOLYBDENUM BY ALLOYING WITH RARE EARTH AND OTHER SELECTED METALS.
Interim rept. no. 6, 1 Sep-31 Oct 62.
4 Dec 62, 13p. incl. tables, ref.
(Contract NOw 62-0305-d)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Hafnium alloys, *Oxidation, Diffusion, Hydrogen, Oxygen, Oxidation inhibitors.

A study is made of the effect of the variables of temperature, partial pressure of oxygen, and alloy composition upon the selective oxidation of Mo-Hf alloys in a hydrogen atmosphere containing very low partial pressures of oxygen. Samples were selectively oxidized at two temperatures, 1200 C and 1300 C, at two partial pressures of oxygen, and at four different alloy compositions (1.0, 5.6, 15.0, and 25.0 atom percent Hf). (Author)

AD-293 232 Div. 17
(TISTM/TCG) OTS price $.75

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION OF THE STRENGTHENING MECHANISMS OF DISPERSION-STRENGTHENED ALLOYS.
Final rept., 15 Mar 61-15 May 62 on Metallic Materials,
by Richard J. Murphy, Varadachari Sadagopan, and Nicholas J. Grant. Nov 62, 24p. incl. illus. tables, 38 refs.
(Contract AF 33(616)8085, Proj. 7351)
(ASD TDR 62-734) Unclassified report

DESCRIPTORS: *Nickel alloys, *Dispersion hardening, Titanium compounds, Borides, Carbides, Powder metals, Diffusion, Alloys, Lattices, Crystal structure, Oxidation inhibitors, Eutectics, Foils, Heat treatment, Grains (Metallurgy), Intermetallic compounds, Electron microscopy, Hardening.

In an effort to produce dispersion-strengthened alloys with higher strength properties than those reported for oxide dispersion-strengthened systems, the systems Ni-TiB2 and Ni-TiC were selected. Dilute binary alloys of carbon, boron and titanium in nickel were prepared both in bar and powder form. Diffusion couples between dilute alloys of Ni-C and Ni-Ti as well as between Ni-B and Ni-Ti were examined in a preliminary way. Lack of appreciable diffusion across the boundary motivated the preparation of alloys by means of powder interactions. Positive interactions were observed but measurements of intermetallic particle size and interparticle spacing have not yet been made. Use of a higher titanium alloy shows more extensive diffusion interaction, suggesting use of less dilute alloys. Transmission electron microscopy is being used to observe strain fields associated with dispersed particles, comparing observations in aged alloys, oxide dispersion-strengthened alloys, and intermetallic dispersion-strengthened alloys. (Author)

AD-293 256 Div. 17
(TISTM/TCG) OTS price $2.60

RAND Corp., Santa Monica, Calif.
MINIMAL WEIGHT DESIGN FOR A BUILT-IN BEAM,
by Oliver Gross. Dec 62, 21p. incl. illus.
2 refs. (Memo. no. RM-3371-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Beams, *Mathematical analysis, Flanges, Thickness, Design, Stresses, Plasticity.

The problem of the design of a horizontal I-beam of variable flange thickness and constant web height is treated. The beam is built in at both ends and is otherwise unsupported, but is subjected to a concentrated vertical unit load that moves slowly from one end to the other. A linear program in function space is obtained, using the concepts of limit analysis (based on the signum-type stress-strain diagram), and the solution of the program is given, yielding the minimum weight design as well as the critical reactions at the ends of the beam. (Author)

AD-293 259 Div. 17, 26
(TISTM/TCG) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Bimonthly rept. no. 4, 4 Oct-4 Dec 62,
by N. M. Parikh. 4 Jan 63, 10p. incl. illus. tables (Rept. no. ARF-B241-4)
(Contract NOw 62-0650-c)
Unclassified report

DESCRIPTORS: *Composite materials, *Reinforcing materials, *Metals, *Fibers, Aluminum alloys, Iron alloys, Tungsten alloys, Carbides, Beryllium alloys, Sintering, Microstructure, Powder metals, Extrusion, Precipitation, Grains (Metallurgy), Heat treatment, Powder metallurgy, Alloys, Processing, Wire, Silver, Chemical milling, Production.

Work was continued on the chemical etching of drawn Be wires to reduce their diameters from 0.0047 to about 0.001 inch. Several matrix alloys were prepared by atomizing. These were prepared by first melting 2S Al in a crucible, adding the alloying elements to the melt, and disintegrating the molten stream of metal of about 100 psi pressure of dry compressed air. The powders thus collected were sieved through a 60 mesh screen and compacted in a 1-inch die. In the work on Be fiber composites, the spread in the size of the fibers was so great that it was difficult to designate an average size. These fibers were mixed with plain 2S Al powder

(-60 mesh), compacted in a 1-inch die at 15 tsi and extruded at temperatures below 870F at an extrusion ratio of about 40:1. The tensile properties and elastic modulus were measured on a Hounsfield Tensometer. It was a chief objective of this series of experiments to see if these composites could be densified by extrusion techniques, and it appears that this technique is satisfactory. (Author)

AD-293 270 Div. 17, 14, 32
(TISTM/ODN) OTS price $7.60

Defense Metals Information Center, Columbus.
SELECTED ACCESSIONS,
comp. by Patricia B. Plate. Nov 62, 63p.
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Bibliography, *Alloys, *Metals, *Refractory materials, *Abstracting, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Beryllium alloys, Titanium alloys, Magnesium alloys, Niobium alloys, Chromium alloys, Composite materials, Molybdenum alloys, Tantalum alloys, Tungsten alloys, Coatings, Carbon, Graphite, Ceramic materials, Oxides.

Contents:
High-strength alloys
Cobalt base, nickel base, engineering steels, stainless steels, iron base
Light metals
Beryllium, titanium, magnesium
Nonmetallics
Carbon, graphite, special refractories, ceramic oxide
Refractory metals
Columbium, chromium, molybdenum, tantalum, tungsten
Miscellaneous
Coatings, applications, composites

AD-293 410 Div. 17
(TISTM/RGR) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIALS - 7075-T6 EXTRUSION AND 2024-T86 SHEET CREEP DATA FOR - DETERMINATION OF,
by P. F. Ghena. 4 Nov 57, 13p. incl. illus. tables (Rept. no. FGT-1774)
(Contracts AF 33(038)21250 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Creep, Extrusion, Sheets, Test methods.

Creep specimens were fabricated from single lots of 2024-T36 Al-clad sheet and 7075-T6. The 2024-T36 specimens were aged to T86 extruded Al alloy. Three specimens of each alloy were tested at each stress level and the results plotted as total creep in 100 hours at 260 F versus stress. Since the measurements were for total creep in 100 hours without regard for any dilation due to over aging or separation of primary and steady state creep, the data cannot be interpolated for lesser times than 100 hours. The average totals for creep in 100 hrs in inches for stresses of 12, 16, and 20 ksi in 7075-T6 and 2024-T86 are: .000277, .000485, and .000780; and .000288, 000338, and .000427, respectively. (Author)

AD-293 471 Div. 17, 25
(TISTM/EJH) OTS price $2.60

Rutgers U. Coll. of Engineering, New Brunswick, N. J.
FATIGUE STUDIES OF METAL CRYSTALS.
Final rept.,
by A. Shrier, J. P. Wallace and others. Jan 63, 21p. incl. illus. tables, 19 refs.
(Contract AF 49(638)17)
Unclassified report

DESCRIPTORS: *Silver, *Zinc, *Single crystals, *Fatigue (Mechanics), Metallic crystals, Deformation, Hardening, Lattices, Fragmentation, Test methods, Hardness, X-ray diffraction analysis, Electron microscopy.

Single crystals of Ag and Zn were fatigued in alternating bending at constant strain amplitude of 0.12% and 0.2% for Ag and 0.01% for Zn. They were studied by a combination of several x-ray techniques, electron transmission microscopy and hardness measurements. The experimental results indicate that the fatigue process may be divided into 3 stages. The initial stage can be identified with cyclic work-hardening and is attributed to a general increase in dislocation density. The second stage represents a period of dynamical recovery. It consists of the removal of dislocations from distorted lattice domains and leads to a decrease of coarse lattice misalignments. At this stage cross-slip seems to play a fundamental role, as a process by which dislocations can escape from their locked positions. When cross-slip was obstructed by a high-angle boundary in Ag or a twin boundary in Zn a premature fatigue failure occurred at the obstruction. The third stage is characterized by an extensive fragmentation of the structure. Due to the interaction of basal and pyramidal slip in Zn the structure resulting from this process shows considerable differences compared to that of Ag. It appears that the high-stress fatigue process (below yield stress) is in principle not different from the low-stress fatigue mechanism except for a higher rate. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-292 605 Div. 18
(TISTB/MD) OTS price $8.10

Operations Analysis Office, Air Defense Command, Colorado Springs.
CODING CRITERIA FOR INTEGRATED MANAGEMENT,
by Irving Katz and John L. Madden. Oct 62, 85p. incl. tables (Operations analysis rept. no. 2)
Unclassified report

DESCRIPTORS: *Management engineering, *Supplies, *Air force logistics, Air force equipment, Air force supplies, Coding, Operations research.

A study of the impact of Item Management Codes (IMC) was requested by the Vice Commander of the Air Force Logistics Command. These codes indicate whether line items of supply will be managed by the Air Force or the Defense Supply Agency (DSA). The study was expected to determine the future effects of IMC codes on AFLC workloads, and to evaluate the reasonableness of the criteria reflected by such codes. This report examines three sets of coding criteria, and finds that the retention percentages of line items currently managed by the USAF would vary from a high of 69% retention (using criteria published by the DOD) to a low of 16% retention (using the

criteria which were used in selecting items for management by the Defense Electronics Supply Center, DESC). The study recommends Air Force support of new criteria, developed by the AFLC Long Range Planning Group and the Operations Analysis Division, which are different from both the DOD set and the DESC set. (Author)

AD-293 147 Div. 18
(TISTA/FRL) OTS price $2.60

Operation Evaluation Group, Office of Naval Operations, Washington, D. C.
THE IMPACT OF ATTRITION ON SUSTAINED OFFENSIVE AIR OPERATIONS.
Interim research memo. rept.,
by G. Haering. 5 Nov 62, 20p. incl. illus. tables (Interim research memo. no. IRM-29)
Unclassified report

DESCRIPTORS: *Air force operations, *Aircraft, Data, History, Warfare, Combat, Operations research, Vulnerability, Life expectancy.

Data from World War II and Korea is used to show that commanders have accepted 5% average aircraft attrition for prolonged periods. Attrition of 20-25% suffered in a short period has caused the abandonment or modification of sustained air operations. The acceptability of attrition rates between these two levels seems to depend on factors other than the actual loss rate itself. (Author)

AD-293 671 Div. 18
(TISTW/RD) OTS price $2.60

RAND Corp., Santa Monica, Calif.
NON-MILITARY APPLICATIONS OF OPERATIONS RESEARCH,
by A. I. Kent. 14 May 54, 19p. incl. illus. (Rept. no. P-526)
Unclassified report

Presented at an invitational meeting at Valley Junior College, Van Nuys, Calif. on June 2, 1954.

DESCRIPTORS: *Military operations, *Naval operations, *Army operations, *Games theory, Information theory, Operations research.

19. NAVIGATION

AD-291 908 Div. 19
(TISTA/FRL) OTS price $4.60

Navy Electronics Lab., San Diego, Calif.
CONTROL, SWITCHING, AND DISPLAY EQUIPMENT FOR VISUAL COMMUNICATIONS IN AIR TRAFFIC CONTROL.
Research and development rept.,
by C. M. Merrow. 3 Oct 62, 46p. incl. illus. tables (NEL rept. no. 1140)
Unclassified report

DESCRIPTORS: *Air traffic control systems, Communication systems, Visual signals, Communication equipment, Display systems, Air traffic controllers, Monitors, Switching circuits, Airport radar systems, Design.

Modular control, switching, and display components were designed and developed. These components can be combined to form visual communications systems that enhance the efficiency of air traffic control coordination. Two practical, sample systems are described. Objective engineering design and installation procedures for such systems were devised. (Author)

AD-292 193 Div. 19, 30
(TISTW/PCR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE MOVEMENTS OF A STATICALLY BALANCED GYROSCOPE IN A CARDAN JOINT, MOUNTED ON A VIBRATING BASE,
by A. M. Lestev. 16 Oct 62, 9p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-1280 from Izvestiya Vysshikh Uchebnykh Zavedeniy; Priborostroyeniye 5:1, pp. 82-88, 1962)
Unclassified report

DESCRIPTORS: *Gyroscopes, Vibration isolators, Vibration mechanisms, USSR, Equations, Mathematical analysis.

A translation of a Soviet technical article entitled ''On the Movements of a Statically Balanced Gyroscope in a Cardan Joint, Mounted on a Vibrating Base'' is presented. The article is a mathematical treatment of the subject.

AD-292 222 Div. 19, 15
(TISTW/PCR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION OF FACTORS, AFFECTING THE ACCURACY IN DETERMINING THE DRIFT OF FLOATING INTEGRATING GYROSCOPES,
by G. A. Slomyanskiy. 29 Oct 62, 13p. incl. illus. table, 1 ref. (Trans. no. FTD-TT-62-1231 from Izvestiya Akademii Nauk SSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, no. 2, pp. 61-69, 1961)
Unclassified report

DESCRIPTORS: *Gyroscopes, USSR, Mathematical analysis, Equations, Theory, Errors, Drift.

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-291 904 Div. 20, 15
(TISTW/PCR) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
A MATHEMATICAL APPROACH TO ECONOMY OF EXPERIMENT IN DETERMINATIONS OF THE DIFFERENTIAL DOSE ALBEDO OF GAMMA RAYS,
by N. F. Shoemaker and C. M. Huddleston.
10 Dec 62, 19p. incl. illus. tables, 3 refs.
(Technical note no. TN-478)
(Proj. Y-F011-05-329(b))
Unclassified report

DESCRIPTORS: *Albedo, Mathematical analysis, Concrete, Energy, Reflection, Scattering, Azimuth, Angle of arrival, Differential equations, Tables, Gamma rays.

Treatments of the differential dose albedo of gamma rays on concrete have supposed that the albedo value is a function of: the energy of the incident gamma radiation, the polar angle of incidence, the polar angle of reflection (or scatter), and the azimuthal angle of reflection. It is demonstrated here that, if certain reasonable assumptions are made regarding the mechanism of reflection, it is not necessary to investigate variations in albedo with azimuthal angle of reflection. Once differential dose albedo has been determined for a complete set of incident and reflected polar angles with zero azimuth, albedo at any azimuth can be derived by a suitable transformation. (Author)

AD-291 909 Div. 20
(TISTP/JW) OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET EXPERIMENTAL PULSED REACTOR. REVIEW OF SOVIET LITERATURE.
5 Dec 62, 8p. incl. illus. 4 refs. (AID rept. no. 62-197)
Unclassified report

DESCRIPTORS: *Nuclear power plants, *Reactor theory, Design, Liquids, Uranium, Salt, Translations, Pulse generators, USSR.

A detailed description is provided of the proposed Soviet Experimental Pulsed Reactor using a water solution of an enriched uranium salt as fuel. Coverage includes general construction details, operating principles, and reactor parameters. The text is accompanied by schematic diagrams of the reactor and curves of reactor parameters. (Author)

AD-291 927 Div. 20
(TISTP/JW) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
RHODIUM-102 HIGH ALTITUDE TRACER EXPERIMENT. I. STRATOSPHERIC RESULTS,
by Marvin I. Kalkstein. July 62, 49p. incl. illus. tables, 28 refs. (AFCRL 62-460, vol. 1) (Proj. 7690)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Radioactive fall-out, *Tracer studies, Motion, Atmosphere, Rhodium, Pacific islands, High altitude, Stratosphere.

To have a unique tracer for studying atmospheric circulation, a large amount of the rhodium-102 isotope was produced in a high altitude nuclear explosion at about 16 deg north latitude and 170 deg west longitude on 11 Aug 58 at 2330 hr. Detonation occurred at about 43 km and it is estimated that the bulk of the debris rose to above 100 km and probably went as high as 150 km. Most results discussed are for air filter samples collected by aircraft at about 20 km in the stratosphere and about 5.5 km in the troposphere. For about a year after this production a few percent of the Rh(102) expected for a well mixed stratosphere was observed in a uniform distribution at about 20 km altitude in the Northern Hemisphere. At this time, concentrations about 1/10 as much were observed at this altitude at 35 deg south latitude. Mixing between hemispheres at this altitude is slow. Beginning in the fall, 1959 and continuing through early winter, concentrations at 20 km increased rapidly in the Northern Hemisphere. It appears that the bulk of the material went to fairly high altitude and was distributed evenly between the two hemispheres in the high stratosphere. Subsequent appearance in the low stratosphere seems to be caused by downward movement selectively in the winter pole region followed by circulation toward lower latitudes at lower altitudes. (Author)

AD-292 073 Div. 20
(TISTP/WH) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
FLUX AND SPECTRAL MEASUREMENTS OF PRIMARY AND MODERATED NEUTRON SOURCES,
by E. Tochilin. 8 Oct 62, 29p. incl. illus. tables, 18 refs. (Rept. no. NRDL-TR-587)
Unclassified report

DESCRIPTORS: *Neutron flux density, *Fission neutrons, *Standards, *Spectrographic analysis, *Dose rate, Neutron counters, Plutonium compounds, Fluorides, Beryllium compounds, Photographic emulsions, Measurement, Simulation.

Radioactive (a,n) neutron sources include Ra-Be, PuF4, and four PuBe13 sources. Comparative neutron emission rates were determined by two separate methods: (1) the manganese sulfate bath with appropriate corrections made for fast neutron escape or capture and for thermal neutron capture by the source; and (2) long counter measurements corrected for energy response and source anisotropy. Agreement to within 1 percent was obtained by the two independent methods. A Ra-Be source calibrated against the NBS neutron standard was used as a primary reference. Spectral measurements of PuBe13 and PuF4 neutron sources were made with nuclear emulsions. By the use of cylindrical plastic and lead absorbers, an effort was made to moderate the PuBe13 spectrum and thereby obtain additional calibration points for instrument response studies. Spectral changes were initially studied with the double-moderator technique, followed by later measurements with nuclear emulsions. From flux and spectral measurements of the primary and moderated radioactive sources, the first collision tissue dose was calculated and, in turn, compared to experimental measurements of absorbed dose with proportional counters designed according to the Bragg-Gray principle. (Author)

AD-292 078 Div. 20, 25
(TISTP/WH) OTS price $13.00

Kaman Nuclear, Colorado Springs, Colo.
LECTURES ON HEAVY PARTICLE INTERACTIONS, HELD AT KAMAN NUCLEAR, COLORADO SPRINGS, COLORADO, JULY 2-18, 1962,
by Earl W. McDaniel, C. Y. Fan and others.
1 Sep 62, 183p. incl. illus. tables, refs. (Rept. no. KN-62-133(R))
(Contracts AF 19(628)209 and NOrd-18098)
Unclassified report

DESCRIPTORS: *Nuclear physics, *Particles, *Transport properties, *Elastic scattering, *Gas ionization, Differential cross sections, *Electron capture, *Protons.

A conference on heavy particle interactions is summarized. The types of interactions examined were those between neutral or ionized atomic systems at energies from a few mev down to thermal. The purpose of the conference was to collect and summarize the present state of knowledge on heavy particle interactions and to suggest lines of future research. The reason for the conference was to study the motion of the atomic debris resulting from very high altitude nuclear explosions. (Author)

AD-292 217 Div. 20, 2
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIATION BALANCE OF THE NORTHERN HEMISPHERE,
by M. I. Budyko, N. A. Yefimova and others.
7 Nov 62, 17p. incl. illus. tables, 10 refs.
(Trans. no. FTD-TT-62-1340 from Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, no. 1, pp. 3-12, 1961)
Unclassified report

DESCRIPTORS: *Northern hemisphere, *Atmosphere, *Radiation effects, Maps, Meteorological charts, Meteorological data, Hydrology, Meteorology, USSR.

The radiation balance of the earth's surface, equal to the difference between the absorbed solar radiation and the effective long-wave radiation, is one of the radiation indices of the radiation climate of a locality. Data on the radiation balance at the present time are used widely in researches of the genesis of climate, in the study of methods of hydrometeorological prognosis, in the study of the effect of meteorological factors on the hydrological regime, etc. A discussion and tabulated data are presented. (Author)

AD-292 281 Div. 20, 4
(TISTM/TCG) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
DETERMINATION OF SULFATE CONCENTRATIONS IN CHROMIUM PLATING SOLUTIONS WITH RADIOACTIVE ISOTOPES.
Report on Materials - Finishes and Coatings - Chromium Plating Solutions Radioactive Isotope Determination of Sulfate Concentrations,
by B. H. Faulkenberry. 8 May 58, 12p. incl. illus. table, 4 refs. (Rept. no. MP-58-024-1)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Sulfates, *Chromium plating, *Radioactive isotopes, Test methods, Precipitation, Sulfuric acid, Chromic acid, Barium compounds, Chlorides, Chemical analysis, Test equipment, Finishes, Coatings, Plating, Solutions.

A radioactive isotope dilution method for determination of sulfate concentration in chromium plating solutions was developed to overcome coprecipitation difficulties experienced with the BaCl2 precipitation method. The method developed had a 2.4% average error, considered satisfactory for the type of analysis, reduced analysis time to 2 hr, and had reproducibility comparable with other methods used for the determination of sulfate concentrations in Cr plating solutions. Details of the methods are given. (Author)

AD-292 334 Div. 20, 21, 25, 30
(TISTW/PCR) OTS price $9.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
ION PRODUCTION AND FLOW IN AN ELECTROHYDRODYNAMIC GENERATOR.
Master's thesis,
by Terry N. Lauritsen. Aug 62, 98p. incl. illus. tables, 14 refs. (Rept. no. GA/ME/62-3)
Unclassified report

DESCRIPTORS: *Plasma physics, *Ions, Generators, Fluid flow, Test equipment, Configuration, Specifications, Ionization, Power supplies, Theory, Gas flow, Nozzles, Magnetohydrodynamics, Design, Tables, Photographs, Drafting, Power plants, Production.

Electrohydrodynamic (EHD) power generation is a process for converting dynamic energy of a flowing fluid directly into electrical power. It differs from magnetohydrodynamics in that only externally applied electric fields are used to interact with the fluid. An experimental EHD generator was built by the Aeronautical Research Laboratory of the Office of Aerospace Research, USAF. It used air for the working fluid, and partially ionized it through the use of multiple corona discharge needles. The objective of this study was to determine the characteristics and trends of ion production and flow in that generator. This study showed that EHD conversion of fluid flow energy to electrical power is possible, and that multiple needle corona discharge is a practical method of ionization for the process. (Author)

AD-292 606 Div. 20, 4, 14
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RESEARCH IN THE RADIATION CHEMISTRY OF PETROLEUM HYDROCARBONS AND THE USE OF NUCLEAR RADIATION IN THE PETROLEUM-REFINING INDUSTRY AND PETROCHEMICAL SYNTHESIS,
by A. V. Topchiev, K. P. Lavrovskiy and others.
15 Nov 62, 18p. incl. illus. tables, 7 refs.
(Trans. no. FTD-TT-62-1047 from Pererabotka Nefti i Gaza Neftekhimiya, Vol. III, 5th International Petroleum Congress, Gostoptekhizdat, Moskva, pp. 345-354, 1961)
Unclassified report

DESCRIPTORS: *Petroleum, *Hydrocarbons, *Radiochemistry, *Organic compounds, Petroleum industry, Refineries, Synthesis, Nuclear energy, Neutron beams, Methanes, Heptanes, Ultraviolet radiation, X rays, Infrared radiation, Stability, Temperature, Radiographic analysis, USSR, Radiation effects.

Research is reported in the radiation chemistry of petroleum hydrocarbons and the use of nuclear radiation in the petroleum-refining industry and petrochemical synthesis. Studies on the radiolysis of alkanes and the radiation, and thermal stability of aromatic hydrocarbons are presented. (Author)

AD-292 626 Div. 20, 25, 30
(TISTW/PCR) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
SOME RESULTS USING OPTICAL INTERFEROMETRY FOR PLASMA DIAGNOSTICS,
by A. F. Klein. 5 Nov 62, 7p. incl. illus. 4 refs. (Rept. no. TDR-169(3210-06)TN-1)
(Contract AF 04(695)169)
(SSD TDR 62-155) Unclassified report

DESCRIPTORS: *Interferometers, *Plasma physics, Electromagnetic fields, Shock tubes, Shock waves, Test equipment, Photographs, Instrumentation, Optical equipment.

Some preliminary results are presented utilizing optical interferometry for plasma diagnostics. A conical-driver electromagnetic shock tube generates the plasma. Interferograms of strong shock waves in hydrogen illustrate the experi-

mental techniques and indicate qualitatively the existence of operating regimes for this tube within which precursor effects are unimportant for determining gas properties behind the shock. (Author)

AD-292 963 Div. 20
(TISTP/JW) OTS price $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
INTERACTION OF ATOMS WITH SURFACES.
Final rept., 1 Apr 58-30 Sep 62,
by J. N. Smith, Jr. and W. L. Fite. 6 Nov 62, 11p. 7 refs. (Rept. no. GA-3615)
(Contract AF 49(638)356)
Unclassified report

DESCRIPTORS: *Atoms, *Gases, Hydrogen, Nickel, Tungsten, Chlorine, Measurement, Chemical reactions, Scattering, Molecular association, Beams, Surfaces.

Experimental modulated atomic beam techniques, adapted for the study of gas-surface interactions, are summarized. The scope and purpose of research conducted, using these techniques, are outlined. Several types of interactions between molecules and atoms at thermal velocities and solid surfaces are discussed. In particular, the dissociation of H2 on tungsten, the scattering of H2 on nickel, and the chemical reaction between C12 and nickel are mentioned. Various other experimental observations and measurements are catalogued. (Author)

AD-292 994 Div. 20
(TISTP/JW) OTS price $8.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
VARIATION IN REFLECTANCE OF VEGETATION AND SOILS CAUSED BY AN UNDERGROUND NUCLEAR EXPLOSION.
Final technical rept.,
by Stephen E. Dwornik, Donald G. Orr, and Leonard M. Young. 1 Nov 62, 77p. incl. illus.
Unclassified report

DESCRIPTORS: *Radiation effects, *Nuclear explosions, *Underground explosions, Reflection, Vegetables, Test methods, Soils.

AD-293 441 Div. 20, 25
(TISTP/WH) OTS price $2.60

Noyes Chemical Lab., U. of Illinois, Urbana.
NUCLEAR RELAXATION OF N-14 BY QUADRUPOLE INTERACTIONS IN MOLECULAR LIQUIDS,
by W. B. Moniz and H. S. Gutowsky. 7 Sep 62, 26p. incl. illus. tables, 15 refs. (Technical rept. no. 58)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: *Relaxation time, *Nuclear spins, *Liquids, *Quadrupole moments, *Nitrogen, Radiofrequency pulses, Molecules.

RF pulse methods were used to measure the N-14 spin-lattice relaxation time in 25 molecular liquids, with the N-14 in several types of group. For eight of the compounds, microwave or pure quadrupole resonance measurements of the N-14 quadrupole coupling constant were combined with our T1 results to give values for the correlation time T/q describing the molecular reorientations which govern T1. These values for T/q at 25 C are about an order of magnitude shorter than reorientational correlation times calculated from the viscosity and molecular radius using the Debye-BPP approach. For the other compounds, T/q was estimated and used with the observed T1 for N-14 to predict values of the quadrupole coupling constant. The temperature dependence of T1 was observed for nine compounds, leading to activation energies for molecular reorientation of 1.4 to 3.2 kcal/mole and inverse frequency factors T/q of 2 to 9 times 10 to the -14th power sec. The temperature dependence of the proton T1 was observed in CH3CN and it is compared with that of N-14. (Author)

AD-293 649 Div. 20
(TISTP/JW) OTS price $2.60

Nuclear Defense Lab., Army Chemical Center, Md.
A COMPILATION OF CAMP CENTURY ENVIRONMENTAL MONITORING DATA FROM 20 MAY 1960 TO 30 JUNE 1961.
Report on Radiological Monitoring,
by Robert J. Nicoll, John W. Kinch and others. Mar 62, 22p. incl. illus. tables (Rept. no. NDL-TR-28)
(DA Proj. 4X12-01-001)
Unclassified report

DESCRIPTORS: *Boiling water reaction, *Radiation hazards, *Radiological contamination, Radioactivation analysis, Greenland, Climatic factors, Measurement, Sampling, Tables, Shielding.

The report contains the results of the first 58 weeks of the U. S. Army Environmental Monitoring Program for the package power reactor located at Camp Century, Greenland. Alpha and beta activities of snow and water samples are reported in microcuries per milliliter. Similar measurements of air samples are reported in microcuries per cubic centimeter of air. Beta-gamma survey readings of the sampling stations are also included. All observed sample activities were below the maximum permissible concentrations recommended by the Atomic Energy Commission. (Author)

AD-293 699 Div. 20
(TISTP/JW) OTS price $1.60

Army Materials Research Agency, Watertown, Mass.
THE ROLE OF ELECTRON MICROSCOPY IN OBSERVATIONS OF RADIATION DAMAGE,
by Allen N. Goland. Nov 62, 10p. incl. tables, 5 refs. (MRL rept. no. 126)
(Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Radiation effects, *Electron lenses, *Electron microscopy, Nuclear reactions, Measurement, Microscopy, Radiation damage.

Radiation-damage theories predict that a variety of defects will be produced in a solid during nuclear bombardment. The special extent of some of these defects is within the resolving power of the modern electron microscope. This paper summarizes the theories and their relationship to electron-microscopic observations of radiation-induced defects. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-291 906 Div. 22, 30, 25
(TISTW/PCR) OTS price $4.60

Naval Weapons Station, Yorktown, Va.
HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE. THE DEVELOPMENT OF TECHNIQUES TO DETECT AND DETERMINE THE EFFECTS OF HEAT ON SELECTED PRIMARY EXPLOSIVES.
Progress rept. no. 3,
by Ernest E. Mason and Dorothy H. Zehmer.
15 July 62, 1v. incl. illus. table (R&D rept. no. 83)
Unclassified report

DESCRIPTORS: *Explosives, Lead compounds, Azides, Vinyl alcohol, Dextrins, Infrared spectroscopy, Gases, Chromatographic analysis, Theory, Instrumentation, Gravimetric analysis, Microscopy, Pressure, Infrared spectrophotometrics, Balances, Photographs, Tests, Test methods, Heat tolerance.

A summary of work conducted to date on a program concerned with determining the effects of heat on selected primary explosives at elevated temperatures is presented. The results of analyses of (1) DDNP, dextrinated lead azide, polyvinylalcohol lead azide, dextrinated and polyvinylalcohol by differential thermal analysis, of (2) DDNP by infrared spectroscopy, and of (3) dextrinated lead azide by gas chromatography are presented and discussed. (Author)

AD-291 957 Div. 22, 30
(TISTP/JW) OTS price $3.60

Defense Research Lab., U. of Texas, Austin.
AUTOMATIC DATA HEADER PROGRAMMER,
by George G. Moore. Aug 62, 18p. illus. (Rept. no. DRL-488; APL rept. no. CF-2988)
(Contract NOrd-16498)
Unclassified report

DESCRIPTORS: *Doppler tracking, *Data processing systems, Programming, Computer logic, Design.

Doppler tracking stations with punched paper tape output require data tape identification. This is done with a data header using a fixed format with variable entries. This report describes a unit devised to automatically program a paper tape punch used to punch the data header preceding the data reduction. The automatic data header programmer is designed to work with a modified Dymec DY-5304 time interval recording system. The programmer is described in detail, and drawings are provided. Modifications necessary to the Dymec DY-5304 system are also described. While designed to operate with other equipment, the design could be adapted to operate with a paper tape punch alone. (Author)

AD-291 974 Div. 22, 33, 27, 11
(TISTW/PCR) OTS price $3.60

Army Armor Board, Fort Knox, Ky.
EVALUATION OF TX 100 TRANSMISSION MOUNTED IN CARRIER, PERSONNEL, FULL-TRACKED, ARMORED, M113E1 (M113E2).
Report of USATECOM Proj. no. 1D-3262-31.
21 Dec 62, 31p. incl. illus. tables, refs.
(Proj. 545-07-032-17)
Unclassified report

DESCRIPTORS: *Transmissions, Tracked vehicles, Tests, Test methods, Maneuverability, Mobile, Fuel consumption, Oils, Human engineering, Maintenance, Reliability, Armored vehicles.

There were three test vehicles each with a 6V53 compression ignition engine mated with the TX100 transmission, identified as the M113E2. Each vehicle operated in excess of 4000 miles on a combination of paved roads, secondary roads, cross-country and over established obstacle courses. A complete engineering performance test was conducted on one vehicle prior to the 4000 miles of endurance and performance testing. Results obtained from this testing were compared with results previously obtained under similar conditions in test of the M113 and M113E1. The test vehicle, M113E2, was found to be equal or superior to the standard M113 in all areas tested. It was only slightly inferior in performance to the M113E1; however, from the standpoint of durability, the M113E2 is superior to the M113E1. The maneuverability of the M113E2 was about equal to that of the M113E1 when the pivot steer kit was installed on the TX100 transmission. (Author)

AD-292 083 Div. 22
(TISTW/PCR) OTS price $2.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
FEASIBILITY STUDY OF AN EXPLODING BRIDGEWIRE PROPELLANT IGNITION SYSTEM FOR A CLOSED BREECH WEAPON SYSTEM,
by Edmund Demberg, Richard W. Snook, and Robert W. Heinemann. Nov 62, 23p. incl. illus. tables (Technical memo. no. 1094)
Unclassified report

DESCRIPTORS: *Electric igniters, Howitzers, Feasibility studies, Guns, Electric detonators, Tests, Test methods, Photographs, Drafting, Artillery.

A study was conducted to determine the feasibility of utilizing an exploding bridgewire (EBW) initiator system for the ignition of propellant in a closed breech system. The 155mm M1A1 Howitzer was selected as the test vehicle in the study. The EBW propellant ignition system yielded chamber pressures ranging from 26,000-31,500 psi, and projectile velocities ranging from 1,774-1,797 fps. The system consisted of a modified 1E 15-N EBW detonator, an X349 (DuPont) modified mild end primer attached to 18 inches of 20/40 pyrocore (DuPont), 67.8 grams of A5 black powder loaded in a cardboard tube, 13.0 lbs of M1 or 12.0 lbs of M6, 0.33 web, propellant charge and a General Laboratory Associates solid state power pack firing system. In 10 tests using a 0.375 MF capacitor charged to 1,000 volts, the EBW system and black powder were initiated. When the capacitor was charged to 700 and 850 volts, no initiation was obtained. (Author)

AD-292 092 Div. 22
(TISTW/PCR) OTS price $2.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
INVESTIGATION OF DEFECTS IN T384 HEAT ROUND BODIES,
by Andrew J. Patrizio. Nov 62, 11p. illus. tables (Technical rept. no. 3014)
Unclassified report

DESCRIPTORS: *Antitank ammunition, *Armor piercing ammunition, Shaped charges, High explosive ammunition, Failure (Mechanics), Machining, Oxides, Steel, Impact shock, Microphotography, Hardness, Tensile properties, Metallurgical analysis, Photographs, Manufacturing methods, Cartridge cases.

A study was conducted on the 105mm T384E4 HEAT round body to determine the cause and nature of the material defects on the outside body surfaces during and after the final machining operations. Majority of the defects were shallow, resulting from rolled-in surface scale which occurred during the tube forming operation at the mill. However, the presence of deep, oxide-filled, radial cracks extending inward from the outside diameter surface was of greater importance. Examination of these cracks indicated they had occurred during heat treatment, as a result of stresses concentrated at the rolled-in surface defects. Based on the findings of this investigation, the particular lot of 4140L steel examined was found unfit for use as shell bodies in high-pressure gun systems. (Author)

AD-292 110 Div. 22
(TISTE/CRJ) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
TWO-CONDUCTOR LOW-PASS TRANSMISSION LINE THEORY.
Quarterly rept. no. 5,
by H. G. Tobin. 30 Sep 62, 42p. incl. illus.
(Rept. no. ARF 5167-Q5)
(Contract N178-7927)
Unclassified report

DESCRIPTORS: *Transmission lines, *Electric detonators, *Electric igniters, *Audiofrequency cables, Dielectrics, Low pass filters, Semiconductors, Elastomers, Silicones, Attenuation, Audiofrequency, Materials.

Effort was concerned with the fabrication of practical models of transmission lines which theoretically exhibit a desired attenuation as a function of frequency. In particular, effort is being concentrated upon the LG type of line. This line may be represented as a series inductance and a shunt conductance. The major difficulties in fabricating this type of line have arisen due to the inability to insure that contact is made between the conducting dielectric and the inner and outer conductors of the line. Some of the proposed techniques for overcoming this deficiency are described. A more thorough discussion of the mismatched transmission line is given. Also included is an analysis of a lump-loaded line which assumes that a pure inductance is used to provide the load. It is concluded that the use of such a technique in an LG line will not allow a steeper rise in attenuation than is now possible. (Author)

AD-292 310 Div. 22
(TISTM/ODN) OTS price $2.60

Rocket Research Lab., Ohio U., Columbus.
DETONABILITY OF NITROUS OXIDE AT ELEVATED INITIAL PRESSURES AND TEMPERATURES.
Report on Aerospace Simulation Techniques Research,
by James A. Laughrey, Loren E. Bollinger, and Rudolph Edse. Sep 62, 20p. incl. illus. tables, 19 refs.
(Contract AF 33(616)5615, Proj. 7065)
(ARL 62-432) Unclassified report

DESCRIPTORS: *Detonation, *Nitrogen compounds, *Oxides, High pressure research, Explosions, Ignition, Pressure, Transducers, Gases.

The detonability of nitrous oxide was investigated at initial temperatures from 23 to 210 C (533 to 870 R) and at initial pressures from 21.4 to 207.1 atmospheres in a high-pressure detonation tube (1.25-inch I.D. by 45 inches in length). No detonations developed during any of the experiments. Some explosions, however, were encountered. The maximum impact pressure was 3.66 times greater than the initial pressure as measured by a quartz crystal transducer. The time intervals of the reactions (from ignition to the maximum pressures) lasted from one to four seconds, which indicated that relatively slow reactions occurred. The results show that nitrous oxide will decompose and burn deflagratively under the conditions employed; at certain higher initial pressures and temperatures, some explosions occurred. (Author)

AD-292 923 Div. 22, 8
(TISTW/PCR) OTS price $3.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF A TEMPERATURE STABILIZED ORDNANCE BINARY TIMER,
by Walter Katz and Robert Huxster. Sep 62, 33p. incl. illus. tables (Technical memo. no. 1017)
Unclassified report

DESCRIPTORS: *Time interval counters, Temperature, Time delay fuzes, Stabilization, Solid state physics, Inductance, Electrostatic capacitance, Oscillators, Specifications, Trigger circuits, Frequency dividers, Transistors, Pulse generators, Electric switches, Diodes, Packaging, Electronic circuits, Wiring diagrams, Photographs, Electronic equipment.

A one-year program for development of a modular electronic timer is described. The timer consists of a stable inductance capacitance oscillator (L. C. Oscillator) feeding a chain of binary counters which can be set in 0.1-second increments up to 1,000 seconds and is ±0.1% accurate over an operational temperature range of 165 to -65 F. The output (capable of initiating an explosive train) is taken from the binaries by an AND gate system through a digital selector switch and gives a single electrical output at the completion of the time cycle. (Author)

AD-292 927 Div. 22, 26
(TISTW/PCR) OTS price $4.60

Lake City Arsenal, Independence, Mo.
HYDRAULIC CRIMPING STATION FOR V-AND-O 20 mm AUTOMATIC CARTRIDGE ASSEMBLY MACHINE,
by H. L. McLean. Nov 62, 29p. incl. illus.
(IED rept. no. 62-2)
(DA Proj. 0074.52.54)
Unclassified report

DESCRIPTORS: *Crimping tools, *Cartridges, Industrial equipment, Machines, Specifications, Photographs, Costs, Quality control, Design, Production, Manufacturing methods, Hydraulic power systems, Hydraulic systems, Machine tools.

The project objective was to incorporate a hydraulic crimping station in one V&O 20mm automatic cartridge assembly machine that would crimp cartridges at the assembly rate of the machine. Design investigation revealed that a 12 unit station would be the most efficient. A 12 unit station design was installed between the projectile insertion station and the chamber

gage station and coordinated with all other stations of the machine. Test runs and production runs have shown this crimping station to have exceeded the best anticipated results. This crimping station has demonstrated its superiority over all other methods of crimping by eliminating the accumulation of cartridges to be recrimped with the attendant costs. (Author)

AD-293 102 Div. 22
(TISTW/PCR) OTS price $8.10

General Electric Co., Burlington, Vt.
M61 VULCAN (MODIFIED BLOCK III) ENDURANCE TEST SUMMARY REPORT (D RATE),
Quality control engineering rept.,
by D. L. Walters. 15 Aug 61, 1v. incl. illus. tables (Rept. no. R61APB785)
(Contract DA 19-020-ORD-5109)
Unclassified report

DESCRIPTORS: *Aircraft guns, Test methods, Tests, Statistical analysis, Bolts, Lock bolts, Firing mechanisms, Solenoids, Torque, Acceleration, Deceleration, Targets, Recoil mechanisms, Maintenance, Operation, Photographs, Automatic weapons.

A summary is given of endurance tests performed on six Block III M61 Vulcan guns at rates ranging from 6000 to 7200 shots per minute. The tests were conducted according to specification, but parts replacement was done on a need basis rather than to set schedule. The parts life information thus obtained has provided sufficient data so that a statistical study of parts life could be performed. (Author)

AD-293 128 Div. 22, 15
(TISTP/WH) OTS price $1.10

Naval Ordnance Lab., Corona, Calif.
RELIABILITY DETERMINATION FOR GENERAL TRICHOTOMOUS SYSTEMS,
by John G. Rau. Nov 62, 6p. (Technical memo. no. 52-68)
Unclassified report

DESCRIPTORS: *Fuses, *Reliability, *Matrix algebra, Determination.

A recursive type procedure is developed for determining the reliability of trichotomous systems whose components are not necessarily identical and, in particular, for dissimilar-channel fuzes. Application of the recursion formulas requires a knowledge of the probabilities of proper function, early function, and dudding of the various components or fuze channels. The analysis is primarily concerned with parallel systems and series systems; however, the results are applicable to series-parallel and parallel-series systems. (Author)

AD-293 161 Div. 22
(TISTW/PCR) OTS price $2.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
FABRICATION AND EVALUATION OF FINAL ENGINEERING LOT NO. FA-X3M-2580 OF CARTRIDGE, BALL, 30MM, T239E1,
by R. Oschell. Nov 62, 21p. incl. illus. (Rept. no. R-1621)
Unclassified report

DESCRIPTORS: *Cartridges, *Aircraft ammunition, Manufacturing methods, Tests, Test methods, Cartridge cases, Electric primers, Propellants, Interior ballistics, Pressure, Velocity, Errors, Tables, Gun barrels, Drafting.

Forty-five thousand T239E1, ball, 30mm cartridges were fabricated and evaluated in final engineering tests. Automatic firings were conducted in the T182 and Mark IV weapons in which primer and case casualties were experienced. The cartridge produced high pressures under cold temperature firing conditions, but gave barrel life and projectile accuracy results within satisfactory limits. (Author)

AD-293 199 Div. 22, 11
(TISTW/PCR) OTS price $1.60

Yuma Test Station, Fort Wainwright, Alaska.
WINTER ARCTIC ENVIRONMENTAL TEST, 1963, OF 105MM HOWITZER, SELF-PROPELLED, XM104.
Memo. rept. no. 1,
by Wahner Brooks. 1962, 15p. incl. illus.
(Proj. ENV-63W)
Unclassified report

DESCRIPTORS: *Howitzers, Tests, Test methods, Arctic regions, Storage, Toxicity, Exhaust gases, Starting, Instrumentation, Heaters, Failure (Mechanics), Self propelled guns.

The XM104 is a self-propelled, full-tracked, 105mm howitzer. It is capable of being transported by HC-1B Helicopter or assault aircraft and delivery by airdrop. The vehicle carries a four-man crew and is designed to provide close-in artillery support. The chassis is of riveted aluminum construction with no superstructure and with an independently mounted gun at the rear of the chassis. A mechanical operated spade, mounted at the rear of the vehicle, and a set of hydraulic suspension lock-outs anchour the vehicle during firing. During this reporting period, the initial mechanical inspection, stowage tests, and break-in tests were conducted. Toxic fumes, breaking tests, cold start, and warm-up tests were also commenced. (Author)

AD-293 292 Div. 22
(TISTW/PCR) OTS price $7.60

Human Engineering Labs., Aberdeen Proving Ground, Md.
MUZZLE BLAST MEASUREMENTS ON HOWITZER, 105MM, XM103E1,
by Howard H. Holland, Jr. Oct 62, 68p. incl. illus. tables, 9 refs. (Technical memo. no. 23-62)
Unclassified report

DESCRIPTORS: *Howitzers, *Gun flash, *Blast, Gun barrel attachments, Pressure, Artillery fire, Tests, Test methods, Ear protectors, Personnel, Instrumentation, Towed bodies, Tables, Photographs, Measurement.

Measurements of muzzle-blast in the crew area of the 105mm Howitzer, XM103, without a muzzle brake and with muzzle brakes WTV-F8241 (High Efficiency), 5/K (Medium Efficiency), and WTV-D8259 (Low Efficiency), were made to determine the peak overpressures produced. The overpressures produced by the four different brake conditions were one of the most important factors determining which brake would be used on the XM102 Howitzer. The howitzer was fired at elevations of 2, 45, and 62 - 68 degrees. It is recommended that the 5/K (Medium Efficiency) Brake is the maximum efficiency brake to be considered for

this weapon. The Watertown Blast Shield provided for this program is not recommended for this weapon. It is recommended that wearing V51R earplugs should be mandatory for all personnel located in the crew area when the 105mm Howitzer, XM102, is fired. (Author)

AD-293 457 Div. 22, 30
(TISTW/PCR) OTS price $2.60

Bureau of Mines, Pittsburgh, Pa.
HYPERVELOCITY IMPACT PHENOMENA.
Quarterly rept., 1 Sep-30 Nov 62,
by Richard W. Watson, Karl R. Becker and Frank C. Gibson. 2 Jan 63, 1v. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Hypervelocity projectiles, *Spallation, Metal plates, Alloys, Velocity, Penetration, Geometry, Fragmentation, Aluminum alloys, Test equipment, Thickness, Ammunition fragments, Hypersonics, Terminal ballistics, Effectiveness, Failure (Mechanics), Impact shock.

Parameters governing the failure of thin metal plates under the impact of highspeed fragments are studied; special emphasis is placed on the lightweight structural alloys. The geometrical features of the perforations, together with the spatial, mass, and velocity distributions of the ejecta produced in the perforation process, are of immediate interest. Since these variables are strongly dependent on the characteristics of the impacting projectile as well as the physical properties of the target material, a variety of experimental approaches to the problem are clearly evident. In an effort to systematize the approach and at the same time gain information that will be of immediate practical value, a few select target materials are currently being investigated under impact conditions that involve the same projectile geometry but different impact velocities. (Author)

AD-293 476 Div. 22, 8
(TISTW/PCR) OTS price $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
HERO SUPPORTING STUDIES.
Monthly progress rept., 1-30 Sep 62,
by Norman P. Faunce and Paul F. Mohrbach. 30 Sep 62, 1v. incl. illus. tables, ref.
(Rept. no. P-B1980-3)
(Contract N178-8102)
Unclassified report

DESCRIPTORS: *Electric igniters, *Radio-frequency attenuators, Impedance, Reflection, Direct current, Theory, Tests, Test methods, Waveguides, Instrumentation, Tables, Photographs.

RF protected MARK 7 MOD 0 ignition elements are currently being evaluated in accordance with the HERO test program. The input impedance and reflection coefficient of the MARK 7 MOD 0 has been determined at various frequencies and direct current tests have been scheduled. A minor modification to the test outline relating dr/dt to current rather than to time is presented. A new RF attenuation measuring system is described in detail. Theory of operation, step-by-step procedure and equipment descriptions are appended. Preliminary measurements of power delivered to an arbitrary load have been made using the dual directional coupler. A number of seemingly contradictory observations have been the most significant result; despite this, an estimate of 14 db for the loss of the MARK 1 MOD 0 plug at 3000 Mc is made and, it is concluded that the system is capable of accuracy within 15 to 20%. More work is to be done to perfect the system, however. (Author)

AD-293 494 Div. 22, 30
(TISTM/EJH) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
MIGRATION OF EXPLOSION BUBBLES IN A ROTATING TEST TANK,
by Hans G. Snay. Oct 62, 30p. incl. illus. 12 refs. (Rept. no. NOLTR 61-145)
Unclassified report

DESCRIPTORS: *Bubbles, *Underwater explosions, Gravity, Migration area, Centrifuges, Integral equations, Differential equations, Test methods, Theory.

The upward migration of pulsating explosion bubbles under the influence of buoyancy (gravity) cannot be studied on a model scale in free water, but only in test tanks. If a stationary test tank is employed the air pressure above the water surface must be reduced to assure similitude. Another alternative, namely a tank which is subjected to a suitably selected acceleration during the explosion test is discussed. The case considered is that where the acceleration is produced by a centrifuge. The Coriolis accelerations distort the motions of the migrating bubble in two ways. First, the 'upward' (i.e. toward the water surface) motion of the bubble is deflected to the side. The sideward motion can be observed experimentally. In the second place, the rotation affects the magnitude of the 'upward' motion and introduces a systematic error which cannot be detected by experimental methods. The bubble migration in a rotating system is treated using the simplifying assumption that the bubble retains its spherical shape. The 'upward' as well as sideward migration is calculated for the first and second cycle of the pulsation. The systematic error in the 'upward' migration was about 1%, which is probably less than the experimental accuracy of such studies. (Author)

AD-293 620 Div. 22
(TISTW/PCR) OTS price $1.10

Raymond Engineering Lab., Inc., Middletown, Conn.
ARM-SAFE DEVICE, XM-52.
Progress rept. for 10 Nov-31 Dec 62,
by Charles Nicoll. 31 Dec 62, 3p. (Rept. no. 598-16)
(Contract DA 19-020-501-ORD-5273)
Unclassified report

DESCRIPTORS: *Arming devices, *Safety devices, Production, Tests, Calibration, Rockets.

AD-293 631 Div. 22, 15
(TISTW/RD) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
EFFECT OF SYMMETRY ON THE LINEARIZED FORCE SYSTEM,
by C. H. Murphy. Sep 52, 13p. (Technical note no. 743)
(Proj. TB3-01081)
Unclassified report

DESCRIPTORS: *Projectiles, *Exterior ballistics, *Complex variables, *Rotation, Mathematical analysis, Spin, Free fall missiles, Functions, Transformations (Mathematics), Vector analysis, Taylor series, Aerodynamic configurations.

Maple and Synge in their paper 'Aerodynamic Symmetry of Projectiles' considered the effect of symmetry in a very general and complete fashion. It is doubted whether this work could be improved on either in method or in results. A somewhat different way of looking at their reasoning may be of some value in reading their paper. Then too, the expression of their results in terms of the ballistic coefficients of the linearized Kelley-McShane theory is of interest. This note has therefore been prepared for these two purposes. (Author)

AD-293 698 Div. 22, 7
(TISTW/PCR) OTS price $1.60

Ogden Air Materiel Area, Hill Air Force Base, Utah.
SERVICEABILITY TEST OF HEATER BLANKET FOR THE MB-1 ROCKET.
Airmunitions test rept.,
by Kenneth A. Kartchner. Dec 62, 10p. incl. illus. (Rept. no. OOY TR 62-27)
Unclassified report

DESCRIPTORS: *Rockets, *Blankets, Tests, Test methods, Arctic tests, Voltage, Test equipment, Air-to-air, Heaters.

This test was initiated to determine if the heater blanket which is installed on the MB-1 Rocket Motor could be used to heat the MB-1 Rocket Motor throughout the winter months without detrimental effects to the heater blanket elements. The serviceability of the heater blanket was determined by subjecting two heater blankets to 70 volts, two heater blankets to 60 volts and two heater blankets to 50 volts. All heater blankets operated satisfactorily for seven months without failure. It is recommended that all bases on which temperatures drop below zero degree Fahrenheit be equipped with a variable power source and adequate connectors for supplying the required voltage to the MB-1 heater blankets. (Author)

23. PERSONNEL AND TRAINING

AD-292 705 Div. 23
(TISTB/DGH) OTS price $2.50

Burroughs Corp., Philadelphia, Pa.
DESIGN OF A PAIRED-ASSOCIATES TRAINER FOR TRAINING RESEARCH.
Final rept., Oct 60-Dec 61 on Training, Personnel, and Psychological Stress Aspects of Bioastronautics,
by G. Lund, R. Hallman and others. Nov 62, 104p. incl. illus. tables.
(Contract AF 33(616)8071, Proj. 1710)
(AMRL TDR 62-104) Unclassified report

DESCRIPTORS: *Training devices, Learning, Military training, Machines, Design, Costs, Reaction (Psychology), Stimulation, Vocabulary, Programming, Memory devices, Reasoning, Memory.

Paired associates learning is the association of a pair of terms in such a way that when one term is presented, the other term is elicited or selected. The stimulus terms are presented one at a time to a student who responds by recalling the response terms or by selecting them from a list. A study program was initiated to develop a device to present training materials, which are reducible to a paired associates format, to a student until a specified level of mastery is reached. The Paired Associated Trainer (PAT) was designed as a research vehicle for a study program concerned with general-purpose, military, paired associates training devices. Complete information, including logic, circuit, and mechanical design, is given herein for a basic Trainer. Features of a proposed expanded Trainer and alternate Trainer designs are presented together with cost estimates on both the basic and the advanced Trainer. (Author)

AD-292 909 Div. 23
(TISTB/DGH) OTS price $5.60

RAND Corp., Santa Monica, Calif.
THE OXNARD BASE MAINTENANCE MANAGEMENT IMPROVEMENT PROGRAM,
by Chauncey F. Bell and T. C. Smith. Nov 62, 51p. incl. illus. (Research memo. no. RM-3370-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Maintenance, *Air force operations, Military requirements, Analysis, Scheduling, Feasibility studies, Effectiveness, Maintenance personnel, Aviation personnel, Management engineering.

The study's primary objective was to accurately identify the maintenance generated by operational requirements, both in the amount of work and the time at which it was required. Such an identification is necessary in order to evaluate flying schedules, estimate the resulting workloads, and plan work schedules to minimize overtime. It was hoped that use of improved information would also improve the organization's alert posture, assist in establishing and justifying personnel requirements, and improve the accuracy and completeness of the data. This report (prepared as a briefing for presentation at several ADC locations as well as Hq. USAF) reviews the results and efforts to date. It demonstrates the feasibility of the data acquisition and processing; answers key questions posed by Oxnard management personnel; and explains and demonstrates several of the graphic displays developed to assist in base management action. (Author)

AD-292 951 Div. 23
(TISTB/DGH) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
RETENTION OF FIRST ENLISTMENT AIRMEN: ANALYSIS OF RESULTS OF A MATHEMATICAL SIMULATION,
by John W. Merck. Aug 62, 10p. incl. illus. table (Rept. no. PRL-TDR-62-17)
(Proj. 7719)
Unclassified report

DESCRIPTORS: *Aviation personnel, *Recruiting, Simulation, Mathematical computer data, Mathematical analysis.

A computerized mathematical model to simulate part of the Air Force personnel system as a source of information for determining recruitment policies is described. The report focuses on the general form of the problem, the model,

and the nature and limitations of the empirical data used. Substantive results, based on recruits for the first half of 1956, are largely byproducts of the data reduction required to obtain the probabilities and distributions used in the model. Contrasting retention data for 2 of the 100 airman groups illustrate potential use of the information in developing tables of expected service life. (Author)

AD-292 960 Div. 23
(TISTA/GEC) OTS price $3.60

Winzen Research Inc., Minneapolis, Minn.
REPORT ON LOW LEVEL BALLOON PILOT TRAINING FLIGHTS.
4 Jan 63, 34p. (Rept. no. 1274-R)
(Contract Nonr-146014)
Unclassified report

DESCRIPTORS: *Balloons, Military training, Flight paths, Balloon gondolas, Design, Pilots.

A series of low level balloon-pilot training flights was conducted. In the jump balloon flights the pilot was suspended from the balloon, through an extended 24 ft diameter parachute, in a nylon harness and seat arrangement. Flight control was afforded by a manual valve located in the balloon apex and by sand ballast secured in bags to the pilot's harness. The flights were of short duration and to very low altitudes. The Sky Car flights employed two-man and four-man open gondolas. The primary objective of the operation, to qualify free balloon pilots, was not achieved, because of unsuitable weather, which limited the number of flights that could be conducted, and adverse trajectories on those flights launched. (Author)

AD-293 239 Div. 23
(TISTB/LMH) OTS price $4.60

Humetrics Div., Thiokol Chemical Corp., Los Angeles, Calif.
DEVELOPMENT OF A JOB SAMPLE PROFICIENCY TEST FOR AN/SPM-9 RADAR TEST SET MAINTENANCE TECHNICIANS. Preliminary rept.,
by G. K. Tallmadge and John V. Murphy. Dec 62, 39p. incl. tables, 15 refs. (Rept. no. H-TR-62-2)
(Contract Nonr-386900)
Unclassified report

DESCRIPTORS: *Aptitude tests, *Vocational tests, Job analysis, Training, Radar training, Achievement tests, Maintenance personnel, Guided missile personnel.

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-292 164 Div. 24, 25, 30
(TISTA/GEC) OTS price $8.10

Institute of Optics, U. of Rochester, N. Y.
PROBLEMS OF PHOTOGRAPHIC SPECTROPHOTOMETRY OF SHORT DURATION LIGHT PULSES: GRANULARITY, RECIPROCITY FAILURE, AND LATENT IMAGE STABILITY. Final rept.,
by Gordon G. Milne and James A. Eyer. 31 Aug 62, 90p. incl. illus. refs.
(Contract DA 49-146-Xz-008)
(DASA 1332) Unclassified report

DESCRIPTORS: *Photographic emulsions, *Spectrophotometers, *Photographic film, Light pulses, Stability, Failure (Mechanics), Radiography, Processing, Measurement, Photographic Recording systems.

Refinements in the technique of measuring granularity and data on the granularity of specific film-developer combinations are presented. A question concerning the shape of the granularity curve appears to have been definitively answered. A rotating mirror optical system has been developed with precise photometric controls for determination of photographic reciprocity failure at high intensity, covering exposure times to 10 to the 8th power seconds. A special underwater arc light source developed for use in this system is described. The experimental requirements for observing latent image stability and data on the characteristics of three panchromatic emulsions are presented. (Author)

AD-292 954 Div. 24, 20
(TISTP/JW) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
A PHOTOMULTIPLIER READ-OUT FOR THE BAUSCH AND LOMB 1.5 METER STIGMATIC SPECTROGRAPH,
by E. B. Mayfield, G. E. Meloy, and A. Y. Lu.
24 Sep 62, 17p. incl. illus. 12 refs. (Rept. no. TDR-169(3210-06)TR-1)
(Contract AF 04(695)169)
(SSD TDR 62-116) Unclassified report

DESCRIPTORS: *Photomultipliers, *Spectrographic analysis, Motion, Tungsten, Temperature, Capacitors, Detonation.

A photomultiplier read-out for the Bausch and Lomb 1.5 meter stigmatic spectrograph is described. This modification utilizes nine photomultiplier tubes of the side window type which cover the spectral range between 2000 and 7000 A. Each photomultiplier tube examines a spectral range of approximately 7 A, and can cover a range of 1100 A. Details of the mounting, of the fine motion adjustment, and of an inexpensive regulated power supply for the photomultiplier tubes are described. The application of the instrument to determine the apparent gray-body surface temperature indicates that for a 0.001 inch tungsten wire, electrically exploded by a capacitor charged to an initial voltage of 25,000 volts, the value is 8500 ± 275 K. Calibration of the instrument was achieved by the use of a National Bureau of Standards spectrally calibrated tungsten ribbon lamp. (Author)

25. PHYSICS

AD-291 907 Div. 25, 2
(TISIM/ODN) OTS price $1.60

Naval Research Lab., Washington, D. C.
A RAY ACOUSTICAL MODEL OF THE OCEAN USING A DEPTH-SOUND SPEED PROFILE WITH A CONTINUOUS FIRST DERIVATIVE.
Interim rept.,
by K. R. Stewart and R. J. Turnbull. 28 Nov 62, 11p. incl. illus. tables, 5 refs. (NRL rept. no. 5843)
Unclassified report

DESCRIPTORS: *Ocean models, *Acoustics, *Underwater sound, Mathematical analysis, Theory, Tables, Data.

A layered method of calculating the ray parameters of range and intensity has been developed in which the sound speed c in a layer is the following function of depth z: c square = 1/(a sub 1)(z square) + (a sub 2)z +9a sub 3 where a sub 1, a sub 2, and a sub 3 are constants. These constants are chosen so that (dc/dz)'s match at layer boundaries, thus creating a depth-sound speed profile which has a continuous first derivative. Some ray characteristics using this type of model have also been studied. The major difficulty with this method is the creation of an excess number of maxima, minima, and points of inflection in the profile if the layer boundaries are not chosen properly. This difficulty can be demonstrated through the use of a sample calculation. (Author)

AD-291 918 Div. 25
(TISTP/JW) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
DIFFRACTION BY A PERFECTLY CONDUCTING SEMI-INFINITE SCREEN IN AN ANISOTROPIC PLASMA.
Technical rept.,
by S. R. Seshadri and A. K. Rajagopal. 15 Oct 62, 18p. incl. illus. 3 refs. (Technical rept. no. 376)
(Contract Nonr-186632, Proj. NR 371-016)
Unclassified report

DESCRIPTORS: *Plasma physics, *Diffraction, Conductors, Electromagnetic waves, Scattering, Dielectric properties, Magnetic fields, Vector analysis, Integral equations, Wave characteristics, Impedance, Shielding.

The scattering of a plane electromagnetic wave by a perfectly conducting semi-infinite screen embedded in a homogeneous plasma is investigated. A uniform magnetic field is assumed to be impressed externally in a direction parallel to the edge of the half-plane. The plasma is idealized by a dielectric characterized by a tensor dielectric constant. The direction of the incident wave is assumed to be in a plane perpendicular to that of the screen. This vector problem is separable into two equivalent scalar problems for which either the electric or the magnetic vector is parallel to the edge of the half-plane. It is found that for the case of the E-mode, the magnetic vector parallel to the edge of the half-plane satisfies a simple wave-equation and a new type of impedance boundary condition on the screen. This problem is formulated in terms of an integral equation which specifies the current induced on the screen. The integral equation is of the Wiener-Hopf type and is solved by the usual function-theoretic methods. A surface wave is found to exist for one orientation of the external magnetic field and the characteristics of this surface wave are determined. (Author)

AD-291 922 Div. 25
(TISTE/OHD) OTS price $11.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
A STUDY OF HIGH-LOW JUNCTIONS AND HIGH-LOW JUNCTION SEMICONDUCTOR DEVICES,
by Robert W. Lade. Nov 62, 148p. incl. illus. 46 refs.
(Contract Nonr-76009)
Unclassified report

DESCRIPTORS: *Solid state physics, *Semiconductors, *Theses, Structures, Films, Conductivity, Analysis, Theory.

The primary objectives were to study the electrical behavior of high-low junctions and their effects on the terminal properties of semiconductor devices in which they are employed. Specifically, a study of the isolated high-low interface bounded by two semi-infinite, quasi-neutral bulk regions has resulted in a set of boundary conditions relating the non-equilibrium carrier densities across the junction to the total, solenoidal current density. In forward bias two distinct classes of RNN+ R devices were considered. The first study assumes the lightly doped side to be intrinsic while the second takes this region as extrinsic. For the intrinsic case, both static and dynamic studies were conducted without the usual unity injection efficiency assumption and as a result, the model is more accurate than those employed in the earlier literature. The extrinsic studies indicate a region of linearity followed by gross nonlinearities at high current levels. The reverse bias properties of high-low junction devices were studied from both the static and dynamic viewpoints and it is shown that for fairly extrinsic low side materials, the structure is linear. Nonlinearity and capacitive reactance effects in near intrinsic low regions are attributed to a minority carrier exclusion effect. (Author)

AD-292 001 Div. 25
(TISTP/LMH) OTS price $10.50

Plasmadyne Corp., Santa Ana, Calif.
PROPERTIES OF PLASMAS AS THEY PERTAIN TO THERMAL ARC-JETS.
Final rept., 15 Feb 61-15 Feb 62,
by C. J. Chen, R. Greco and others. Aug 62, 131p. incl. illus. tables, 50 refs.
(Contract AF 33(616)8173, Proj. 1(10-3048))
(ASD TDR 62-451) Unclassified report

DESCRIPTORS: *Plasma jets, *Heat transfer, *Plasma physics, High temperature research, Electrodes, Gases, Heat engines, Pressure, Kinetic theory, Energy, Liquid rocket propellants, Electric arcs, Thermodynamics.

Information is presented which will aid in selecting propellants for use in electro thermal engines. Several potential propellants were examined. These include hydrogen, ammonia, helium lithium hydride, nitrogen, methane, air, argon and lithium. Discussions of important propellant properties and their effect on engine performance and life are included. The effect of the propellant choice on the operation of the arc-jet is considered. This includes examining theoretical thruster efficiency, engine life and the effect of the engine's mission. Experiments were performed for eight propellants using Plasmadyne's one-kilowatt engine. The results of these tests are discussed. (Author)

Division 25 - PHYSICS

AD-292 011 Div. 25, 4
(TISTM/ODN) OTS price $.75

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
X-RAY POWDER DIFFRACTION DATA FOR SOME FERROCENE DERIVATIVES.
Final rept., Jan-Aug 62 on Materials Analysis and Evaluation Techniques,
by William L. Baun and Mark Goldschmidt. Nov 62, 41p., incl. illus. tables, 13 refs.
(Rept. no. ASD TDR 62-874)
(Proj. no. 7360, In cooperation with University of Dayton, Ohio).
Unclassified report

DESCRIPTORS: *X-ray diffraction analysis, *Ferrocenes, Alkyl radicals, Benzoyl radicals, Phenyl radicals, Methyl radicals, Silicones, Hydroxides, Ethyl radicals, Oximes, Alkoxy radicals, Cyanates, Carboxylic acids, Fluorides, Ketones, Crystals, Molecular structure.

Application of X-ray diffraction to identification of polycrystalline ferrocene derivatives is discussed. These compounds are well suited to X-ray diffraction analysis because of their crystalline nature and the individualistic patterns obtained even in closely related substitutions. Data are shown for various mono and di-substituted compounds. Emphasis is placed on effects noted in long chain substitutions and spacings are given for 12 of this type of compound. Powder diffraction data and other physical properties are shown for twenty ferrocene derivatives which were synthesized for research on ultraviolet absorbers for space vehicles. (Author)

AD-292 035 Div. 25, 8, 6
(TISTM/JEA) OTS price $5.60

Sylvania Electric Products Inc., Mountain View, Calif.
RESEARCH ON TECHNIQUES FOR LIGHT MODULATION DETECTION.
Interim engineering rept. no. 2, 1 Sep-1 Dec 62,
by B. J. McMurtry, J. B. Gaenzle, and R. Targ. 1 Dec 62, 47p. incl. illus. 16 refs.
(Contract AF 33(657)8995)
Unclassified report

DESCRIPTORS: *Phototubes, *Lasers, *Light communication systems, Photosensitivity, Photomultipliers, Photoemission, Thermionic emission, Optical analysis, Signal-to-noise ratio, Power amplifiers, Frequency modulation, Microwave frequency, Broadband, Design, Velocity, Light, Traveling wave tubes, Detection, Microwave equipment, Modulation.

A continuing comparison of light detection schemes has reaffirmed the conclusion that the microwave phototube is the most promising method to detect light modulation. Progress is described in the following areas: (1) theoretical analysis of microwave phototubes; (2) microwave phototube construction, including photosurface preparation and evaluation; and (3) experimental measurements on microwave phototubes, and comparison with theory. (Author)

AD-292 081 Div. 25
(TISTP/WH) OTS price $8.10

Michigan U. Coll. of Engineering, Ann Arbor.
EVALUATION OF MATRIX ELEMENTS IN CRYSTALLINE FIELD THEORY,
by Sow Hsin Chen. Oct 62, 76p. incl. tables, refs. (Rept. no. 04275-1-T)
(Contract AF 49(638)987)
Unclassified report

DESCRIPTORS: *Microwaves, *Crystals, *Tensor analysis, *Atomic structure, Crystal structure, Solid state physics, Absorption.

Contents:
Definition of irreducible tensor operators
Tensor-product and scalar product of two tensors
Double tensors (Two-sided tensors)
Wigner-Eckart theorem
Matrix elements of spin-free operators $T^k_q(2)$
Matrix elements of tensor product of two commuting tensors
Matrix elements of scalar product of two commuting tensors
Matrix elements of double tensors
Evaluation of the reduced matrix element $(\alpha SL\|T^{qp}\|\alpha'S'L')$ and $(\alpha SL\ T^k\|\alpha'S'L')$
Recursion formula
Matrix elements of electrostatic interaction
Matrix elements of crystalline field potential
Matrix element of the spin-orbit interaction
Matrix element of the spin-spin interaction
Matrix elements of nuclear-electron magnetic interaction
Matrix elements of nuclear-electron quadrupole interaction

AD-292 088 Div. 25
(TISTE/CAM) OTS price $1.60

White Sands Missile Range, N. Mex.
A WIDE BAND SPECTRUM SURVEILLANCE SYSTEM,
by E. R. Dryden, Jr. Nov 62, 9p. incl. illus.
(Technical rept. no. SELWS-E-107)
(DA Proj. NR 3C16-19-001)
Unclassified report

DESCRIPTORS: *Frequency analyzers, *Radiofrequency spectrum analyzers, Radio signals, Broadband, Analysis, Sensitivity, Display systems, Electronic equipment, Model tests.

The wide band spectrum surveillance system is under development to provide a monitor system capable of simultaneously observing large portions of the frequency spectrum. The purpose of the system is to determine the presence of intermittent, spurious and short duration signals and to provide a simple and direct method of signal analysis for rapid identification. The prototype model has a frequency range of 160-1100 Mc and is to be extended to 12,000 mc. (Author)

AD-292 108 Div. 25
(TISTM/SJR) OTS price $2.60

Eitel-McCullough, Inc., San Bruno, Calif.
SURFACE EXPLOSIONS ON SOLIDS BY HIGH-DENSITY ELECTRON BOMBARDMENT.
Final rept.,
by Oskar Heil and Siegfried Vogel. Oct 62, 24p. incl. illus. 2 refs.
(Contract AF 19(628)1606, Proj. 4619; Continuation of Contract AF 19(604)8810)
(AFCRL 62-904) Unclassified report

DESCRIPTORS: *Electron bombardment, *Electron beams, *Cathodes, Ion beams, Plasma jets, Electrostatic fields, Electron guns, High temperature research, Tantalum.

The object of this study is to investigate surface explosions and the structural changes of matter caused by high temperatures, large temperature gradients, and fast quenching rates connected with electron bombardment. An existing high perveance electron gun with a high area convergence ratio was adapted for the experiments. Since the energy density in the bombarded spot is inversely proportional to the cathode area at a given maximum emission density, a

cathode diameter of 0.6 cm or an area of 0.5 sq. cm was chosen. This results in a specific cathode load of 9.2 amperes/sq. cm at 15,000 volts. To draw such a current, the pure tantalum cathode is heated to about 2750 K by electron bombardment. At the beginning of the pulse, the exposed area is equal to the electron beam cross-section in vacuum, but is reduced very rapidly by additional ion focusing caused by evaporation of the target material. Because of this, the effective energy density is increased by at least an order of magnitude. The tantalum particles, being at temperatures around the melting point, emit electrons readily and charge positive in an electrostatic field. In the inhomogeneous axial symmetric field around wires particles were trapped in orbit during a series of experiments. (Author)

AD-292 114 Div. 25, 14
(TISTM/REB) OTS price $9.60

Corning Glass Works, N. Y.
INVESTIGATION OF THE MECHANISM OF SINGLE CRYSTAL GROWTH IN HIGH TEMPERATURE SYSTEMS.
Final rept., June 61-June 62,
by J. A. Marley and T. C. MacAvoy. Sep 62,
105p. incl. illus. tables, 9 refs.
(Contract AF 19(604)8447, Proj. 5621)
(AFCRL 62-771) Unclassified report

DESCRIPTORS: *Single crystals, *Vapor plating, *Tin compounds, *Cadmium compounds, *Oxides, Ceramic materials, Growth.

High temperature vapor deposition techniques have been successfully adapted to the growth of single crystals of Sn (IV) and Cd oxides. Crystallization and growth were studied under both neutral and oxidizing conditions and the various parameters effecting crystal size, purity and perfection were evaluated. The use of a He-O gas mixture for vapor transport was found to substantially benefit the growth process by eliminating both bulk and surface defects. A discussion is presented of past electrical measurements performed on Sn oxide films and ceramics together with some of the difficulties in interpreting non-single crystal data. The results of resistivity, Hall effect and optical measurements on Sn oxide single crystal grown by the present method are reported. Other measurements include studies on the crystal structure and perfection of synthetic Sn oxide by x-ray and microscopic techniques; electron spin resonance studies on Sn oxide crystals containing vanadium impurity additions; and a discussion of analytical methods which were applied to trace impurity analysis on single crystals of both Cd and Sn oxides. (Author)

AD-292 118 Div. 25
(TISTP/WH) OTS price $8.10

Watertown Arsenal Labs., Mass.
THE ROTATIONALLY SYMMETRIC MOTION OF A CYLINDRICAL SHELL WITH VARIOUS END CONDITIONS DUE TO VARIOUS CONSTANT VELOCITY LOADS.
by Francis I. Baratta. Nov 62, 82p. incl. illus. tables, 3 refs. (Technical rept. WAL TR 850/13)
(DA Proj. 51601006)
Unclassified report

DESCRIPTORS: *Beams, *Structural shells, *Rotation, *Vibration, *Structures, *Cylindrical bodies, *Loading, Mathematical analysis.

The general problem of thin cylinders is analyzed with various end conditions for the rotationally symmetric motions caused by the passage of a pressure front of constant velocity along the axis of the cylinder. The method of Virtual Work is applied to a generatrix of the cylinder, which is then treated as a beam on an elastic foundation with various end conditions. The results are presented in terms of three radial deflection components: (a) bending deflections, (b) rigid body translations, and (c) rigid body rotations. The resulting equations for the many cases considered and for particular end conditions are presented in tabular form. (Author)

AD-292 133 Div. 25
(TISTP/JW) OTS price $5.60

Airborne Instruments Lab., Inc., Mineola, N. Y.
SOLID-STATE CIRCUITS.
Quarterly progress rept. no. 2,
by S. Hamilton, W. W. Heinz and others. Oct 62,
1v. incl. illus. tables, 12 refs. (Rept. no. 1654-I-2)
(Contract AF 30(602)2699, Proj. 4506)
(RADC TDR 62-547) Unclassified report

DESCRIPTORS: *Solid state physics, *Broadband probes, Single crystals, Diodes, Resonance, Magnetism, Radar, Ferrites, Gallium, Impedance, Limiters.

Two types of broad-band solid-state limiters for protecting receivers operating in the 400 to 800 mc range are being investigated--ferrite limiters and varactor-diode limiters. Single crystal gallium-substituted yttrium-iron garnet (gallium-YIG) having a saturation magnetization (4 pi M sub s) of 420 gauss has been considered for the ferrite limiter. Several attempts to obtain limiting action with a gallium-YIG sphere in a cross-resonator structure were unsuccessful. As a result, a detailed program was initiated to measure some of the important crystal characteristics such as anisotropy, linewidth, and susceptibility decline. It was found that the crystal has relatively high first- and second-order normalized anisotropy constants (about -110 and -30 oersteds) and large linewidths (about 30 oersteds). Measurements on the susceptibility decline correlated well with the measured linewidths. Two types of varactor diodes are being investigated for use in non-parametric-type limiters--PN and PIN. The PN diodes were tested in a limiter configuration at high pulse powers using a 1-megawatt L-band radar. The incident burnout energy was found to be 87,000 ergs, which is about ten times greater than expected. (Author)

AD-292 166 Div. 25
(TISTP/JW) OTS price $7.60

Electrical Engineering Research Lab., U. of Texas, Austin.
A SOLUTION FOR ELF PROPAGATION IN THE EARTH-IONOSPHERE CAVITY BOUNDED BY AN INHOMOGENEOUS, ANISOTROPIC IONOSPHERIC MEDIUM,
by Carroll W. Chapman. 31 Oct 62, 71p. incl. illus. tables, 14 refs. (Rept. no. 6-50)
(Contract AF 19(604)8038, Proj. 5631)
(AFCRL 62-792) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Ionosphere, Wave characteristics, Conductivity, Tensor analysis, Differential equations, Magnetic fields, Polarization, Resonance, Electron bombardment, Density.

Propagation of ELF waves in the earth-ionosphere cavity is considered for an inhomogeneous, anisotropic ionospheric medium. The ionosphere is characterized macroscopically by a tensor conductivity which is based on recent theoretical and experimental data of electron densities and

electron collision frequencies in the altitude range 50 to 120 km. It is shown that for a plane stratified ionospheric medium, the tensor conductivity components may be approximated by rational functions of exponentials which allow solutions of the Maxwell equations to depend upon solutions of linear differential equations with polynomial coefficients. The resulting systems of equations are rather complicated; however, the problem in which the direction of propagation is perpendicular to the earth's magnetic field and parallel to the earth's surface is solved for vertically polarized waves under the assumption that the lower boundary of the ionosphere is located at approximately 75 km. The numerical results which consist of resonant frequencies and attenuation rates for frequencies below 60 cps are compared with identical quantities obtained using an homogeneous isotropic model ionosphere which has been derived elsewhere. (Author)

AD-292 178 Div. 25, 9
(TISTP/JW) OTS price $5.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
INTERFEROMETER STUDY OF THE EFFECT OF REDUCED PRESSURE ON FREE CONVECTION FROM A VERTICAL PLATE.
Master's thesis,
by Richard Clayton Walker. Aug 62, 49p. incl. illus. tables, 10 refs. (Rept. no. GAE/ME/62-5)
Unclassified report

DESCRIPTORS: *Convection, *Interferometers, Theses, Boundary layer, Heat transfer, Fluid flow, Measurement, Instrumentation, Pressure.

An interferometer study of the effect of reduced pressure on free convection from a vertical plate is presented. The interferometer was used to visually observe the boundary layer on the plate and to determine the heat transfer coefficient over a range of pressure from 0.987 to 0.09 atm. The free-convective heat transfer coefficient was experimentally found to be proportional to the 0.47 power of the pressure which is within experimental limits of the theoretical prediction (0.50 power of the pressure). The boundary layer thickness was observed to increase as the pressure was reduced. (Author)

AD-292 180 Div. 25, 9
(TISTP/JW) OTS price $11.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
THE DESIGN AND PERFORMANCE OF A CONVERGENT-DIVERGENT NOZZLE FOR THE MECHANICAL ENGINEERING LABORATORY SHOCK TUBE.
Master's thesis,
by Carroll Clifford Rands. Aug 62, 136p. incl. illus. tables, 15 refs. (Rept. no. GAE/ME/62-3)
Unclassified report

DESCRIPTORS: *Shock tubes, *Mach number, Pressure, Reliability, Reynolds number, Theses, Test methods, Design, Nozzles.

The installation and test of a two-dimensional, sharp-edge-throat, Mach 3 nozzle in the Mechanical Engineering Laboratory shock tube is presented. Preliminary tests on an abrupt area reduction resulted in the selection of a 1-inch nozzle throat height. Wooden nozzle blocks were installed and test runs were conducted with a constant chamber pressure and varied channel pressure to produce incident shock waves of increasing strength. Analysis of high-speed motion pictures indicates that the nozzle test section Mach number is independent of incident shock strength; however, available and usable test times increase with increasing incident shock strength. A plenum chamber attached to the low-pressure channel helped produce Mach 2.6 - 2.8 flows for up to 18 milliseconds. (Author)

AD-292 182 Div. 25
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVELOPMENT OF ACOUSTIC INVESTIGATIONS,
by A. V. Rimskiy-Korsakov. 7 Nov 62, 4p. (Trans. no. FTD-TT-62-1346 from Vestnik AN SSSR, no. 11:pp. 120-121, 1958)
Unclassified report

DESCRIPTORS: *Acoustics, Ultrasonics, Nonlinear systems, Translations, Symposia, Sound generators.

Between May 26 and June 4 in Moscow was held the Fourth All Union Acoustic Conference. The conference was frequented by about 1000 delegates, including from Leningrad, Kiev, Lvov, Gor'ki, Permi, Tashkent and other cities of the Soviet Union. There were also acoustic-specialists from China, Poland, Czechoslovakia, Hungary, Rumania, German Democratic Republic, Dunmark, and USA. About 180 reports on various subjects were read, which indicates the considerable rise in the number of investigations on acoustics and the greater interest in the achievements of this science by scientific and industrial institutions of the USSR. In the section of sound propagation in heterogeneous media, very interesting was the series of reports devoted to radiation methods of determining the field intensity and to the propagation in waveguides, particularly with irregular heterogeneities. At the meetings of nonlinear acoustics, reports pertaining to the solution of problems regarding propagation of waves of finite amplitude, as well as problems of sound formation were presented. Lectures on noise generation by intersecting gaseous streams and about noise emitted by an electric discharge in a liquid were given, etc. (Author)

AD-292 185 Div. 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PLASMA ELLIPSOID IN ITS OWN FORCE FIELD,
by A. Ya. Voronov. 30 Oct 62, 12p. 3 refs. (Trans. no. FTD-TT-61-67 from Vestnik Moskovskogo Universiteta, Fizika, Astronomiya, Series III, no. 5:pp. 74-80, 1960)
Unclassified report

DESCRIPTORS: *Plasma physics, *Ellipsoids, Translations, Diffusion, Equilibrators, Stability, Velocity, Fluid flow.

The conditions of equilibrium and stability of a charged spatially restricted plasma are examined. (Author)

AD-292 209 Div. 25
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE DISTRIBUTION OF IONS IN THE PLASMA OF AN ARC DISCHARGE,
by M. N. Turko. 7 Nov 62, 15p. incl. illus. 9 refs. (Trans. no. FTD-TT-62-1225 from Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, no. 6, pp. 14-22, 1961)
Unclassified report

DESCRIPTORS: *Plasma physics, *Gas ionization, Electric discharges, Electric arcs, Ions, Cathodes, Anodes, Iron, Electrodes, Vaporization, Polarization, Distribution, USSR, Mathematical analysis.

Certain features of the axial distribution of ions and neutral atoms in the interelectrode space of a half-wave low-current a-c arc have been studied. The degree of ionization of the iron atoms in the positive column depends upon whether these atoms enter the plasma from the cathode or the anode: when the iron vaporizes from the anode, the degree of ionization is higher than when it vaporizes from the cathode. In order to explain this phenomenon, it is necessary to assume that the ion concentration is determined not only by the conditions of thermal ionization, but also depends upon the entry of ions from the near-electrode regions under the action of the field and diffusion. The true value of the degree of ionization differs from the equilibrium value given by Saha's formula. The magnitude of the deviation depends on the field intensity in the column, the concentration of nautral atoms, and also on the ion-concentration gradients; its sign is determined by the polarity of the electrode from the surface of which the given element vaporizes. This effect is not just observed in the case of an arc between silver and aluminum electrodes, for when the polarity of these electrodes changes, the effective ionization potential of the plasma changes, and this compensates for the effect of the field. (Author)

AD-292 218 Div. 25, 20
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE STRENGTH OF THICK-WALLED CYLINDRICAL AND HOLLOW SPHERICAL SHELLS EXPOSED TO IRRADIATION, by A. A. Il'yushin and P. M. Ogibalov. 25 Oct 62, 17p. incl. illus. 14 refs. (Trans. no. FTD-TT-62-719 from Inzhenerniy Sbornik 28:pp. 134-144, 1960)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Spheres, *Hemispherical shells, *Radiation effects, Neutron beams, Nuclear energy, Deformation, Elasticity, Stresses, Stainless steel, Steel, Plasticity, Crystal structure, Lattices, Metals, Alloys, Solids, Neutron flux density, USSR.

The irradiation of solid bodies is accompanied by numerous effects which result in a volume deformation, changes in the elastic, and especially the plastic characteristics of the material. The dependence of the modulus of elasticity, the yield point, the tensile strength, and the entire stress-strain diagram on the total flux nvt was studied experimentally after irradiation of the specimens in a nuclear reactor. (Author)

AD-292 235 Div. 25
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NONLINEAR EFFECTS IN A MAGNETOACTIVE PLASMA, by V. V. Zheleznyakov. 30 Oct 62, 10p. 8 refs. (Trans. no. FTD-TT-61-277 from Izvestiya Vysshikh Uchebnykh Zavedeniy 1:5-6, pp. 29-33, 1958)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, *Plasma oscillations, Perturbation theory, Magnetic fields, Electric fields, Propagation, Polarization, Electrons, Amplitude modulation, Vector analysis, Frequency, Absorption, Resonance, USSR.

The frequency dependence of cross modulation (Luxemburg-Gorkov'skiy effect) is discussed. It is shown that in a homogeneous magnetoactive plasma, cross modulation increases as the frequency of the perturbing wave approaches values at which the absorption index of this wave rises abruptly. These values, generally speaking, do not coincide with the gyrofrequency. The conclusion concerning the resonance of cross modulation at the gyrofrequency in a homogeneous plasma, previously drawn in the theory of the Luxemburg-Gorkov'skiy effect, was due to not taking into account the nature of the polarization of the perturbing wave in the presence of a magnetic field. (Author)

AD-292 236 Div. 25, 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENTAL STUDY OF HEAT TRANSFER WITH MELTING OF A METAL AND WITH MOLTEN METAL FED THROUGH A POROUS WALL IN A SUPERSONIC STREAM, by I. A. Zotikov and L. N. Bronskiy. 30 Oct 62, 8p. incl. illus. tables, 8 refs. (Trans. no. FTD-TT-62-1328 from Inzhenerno-fizicheskiy Zhurnal 5:4, pp. 10-14, 1962)
Unclassified report

DESCRIPTORS: *Liquid metals, *Metals, *Heat transfer, *Supersonic flow, Melting, Porous materials, Surfaces, Fluid flow, Dynamics, Thermodynamics, Films, USSR.

Experiments are described on heat transfer on the surface of a body while it is being melted in a supersonic stream while molten metal is being fed to the surface through a porous wall. Quantitative relations are presented which are explained by the influence of the liquid film running off upon heat transfer. (Author)

AD-292 265 Div. 25
(TISTB/CCH) OTS price $8.60

Vitro Labs., West Orange, N. J.
THERMAL WAVES AND THERMAL STRESSES. A Preliminary Study and report on FBM System Effectiveness Analysis, by Henri Marcus. 30 July 62, 85p. incl. illus. tables, 18 refs. (Rept. no. VL-2103-73-0; Research memo. no. 10)
(Contract Nonr-238000)
Unclassified report

DESCRIPTORS: *Thermal radiation, *Stress (Physiology), Shocks, Temperature, Distribution, Mathematical analysis.

The results of a preliminary study intended to analyze the effects of the sudden application of a heat source on one side of a plane or cylindrical wall are presented. The disturbance in temperature, stress and strain on the wall caused by such a thermal shock has in many respects a great similarity with the disturbance caused by a mechanical shock. This similarity suggests considering the gradual propagation of the thermal disturbance as the propagation of a thermal wave. Consequently, it is the objective of this report to investigate the correlation between the boundary conditions of the wall and the mechanism of the successive formation of incident, reflected and refracted thermal waves. (Author)

Division 25 - PHYSICS

AD-292 266 Div. 25
(TISTM/ODN) OTS price $2.60

Harvard Coll. Observatory, Cambridge, Mass.
SHOCK-TUBE SPECTROSCOPY IN THE ULTRAVIOLET.
Final rept., 15 June 61-30 June 62,
by W. H. Parkinson and E. M. Reeves. 30 June 62, 25p. incl. illus. tables, refs.
(Contract Nonr-186644, Proj. 012-208)
Unclassified report

DESCRIPTORS: *Shock tubes, *Plasma physics, *Ultraviolet spectroscopy, Chlorides, Absorption, Shock waves, Fluorides, Lithium compounds, Titanium compounds, Oxides, Nitrides, Powder metals, Aluminum, Barium compounds, Atomic spectrum.

This report includes:
THE ABSORPTION SPECTRUM OF SHOCK-EXCITED BARIUM, by W. R. S. Garton, W. H. Parkinson, and E. M. Reeves. Apr 62.

Previous experiments had shown that the high temperature associated with reflected shock waves during their interaction with powdered solids produces sufficient vapor pressure for emission and absorption studies in the visible and quartz regions. The extension to the ultraviolet and vacuum ultraviolet required as a background source a high-current density flash tube and lithium fluoride windows able to withstand the high-pressure transient of the shock wave. This report discusses the initial results of the flash tube-shock tube combination in the ultraviolet and vacuum ultraviolet wavelength regions. (Author)

AD-292 309 Div. 25, 4
(TISTM/ODN) OTS price $1.60

Pennsylvania State U., Mineral Industries Experiment Station, University Park.
EFFECTIVENESS OF SHEARING STRESSES IN ACCELERATING SOLID PHASE REACTIONS AT LOW TEMPERATURES AND HIGH PRESSURES,
by Frank Dachille and Rustum Roy. 3 Aug 62, 15p. incl. illus. 13 refs. (Technical rept. no. 12; Contribution no. 61-53)
(Contract Nonr-65620)
Unclassified report

DESCRIPTORS: *Phase studies, *Solid state physics, *Solids, *Minerals, Shear stresses, Low temperature research, High pressure research, Thorium compounds, Silicates, Niobium compounds, Oxides, Silicon compounds, Dioxides, Calcium compounds, Carbonates, Lead compounds, Phase transitions, Reaction kinetics.

The use of displacive shearing stresses in the study of phase equilibria in opposed anvil high pressure apparatus has been of value in resolving the relationship of the anomalous polymorphic thorite-huttonite phases of $ThSiO_4$ and in achieving the first reversibility of the high-low temperature forms of Nb_2O_5. Such stresses do not alter noticeably equilibrium, as shown previously by the examples of the calcite-aragonite and quartz-coesite transitions, among others, but do contribute markedly to increasing reaction rates at low temperatures. This is further illustrated in a kinetic study of the PbO_2 I-II transition at 40 kb from 25 to 400 C. (Author)

AD-292 324 Div. 25 30
(TISTM/EJH) OTS price $2.60

Wheeler and Wheeler Associates, Branford, Conn.
RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS.
Report on Research in Solid State Physics,
by R. G. Wheeler and G. W. Wheeler. Sep 62, 18p. incl. tables, 11 refs.
(Contract AF 33(616)8314, Proj. 7885)
(ARL 62-433) Unclassified report

DESCRIPTORS: *Cryogenics, *Paramagnetic salts, *Solid state physics, *Single crystals, *Quantum mechanics, *Magnetic susceptibility, Paramagnetic resonance, Molecular spectroscopy, Impurities, Cadmium compounds, Zinc compounds, Sulfides, Selenides, Atomic energy levels, Optics, Magnetic properties, Laboratory equipment, Materials, Thermometers.

A brief description of the magneto-optical and magnetic susceptibility research system installed at the Aeronautical Research Laboratories is given. Theoretical considerations are developed concerning the use of doped CdS and ZnS single crystals as ultra-low temperature paramagnetic salts. One concludes that CdS:Mn^{+2} is a possible thermometric salt while CdS:Eu^{+2} may be an excellent working salt. Theoretical considerations are made concerning the possibility of observing the molecular spectra associated with impurity-exciton complexes in CdS and CdSe. It appears that of the four simplest complexes considered, the spectra associated with the ionized donor-exciton system is the most likely to be observed. The energetics and symmetries of these systems are considered for $C_{sub\ 6v}$ symmetry.

AD-292 338 Div. 25, 30
(TISTE/OHD) OTS price $9.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A STUDY OF AN ARC WITH A VARIABLE GEOMETRY ANODE.
Master's thesis,
by James R. Tedeschi. Aug 62, 92p. incl. illus. tables, 11 refs. (Rept. no. GA/ME/62-7)
Unclassified report

DESCRIPTORS: *Electric arcs, *Electric discharges, Anodes, Argon, Electrostatic fields, Experimental data.

The arc characteristics and heat transfer of a variable geometry anode were studied. The arc was a self-sustained discharge, in an argon atmosphere, between a copper anode and a tungsten cathode. Both electrodes were water cooled. The anode was constructed in two parts, a center post and a movable outer envelope. Extension or retraction of the outer envelope permitted investigation of various anode configurations, among which were a flat anode and one which completely enclosed the arc column. The major areas of interest were studied for arc lengths of 0.6 inch, 1.0 inch, and 1.2 inches, and for two currents, 25 and 47 amperes. The number of outer envelope extensions studied depended on the arc length. The results of the investigation showed that the arc enclosure did not affect the negative characteristic of the arc, but did reduce the arc potential. The anode fall was reduced by increasing the arc enclosure and current. Heat loss to the anode attained a maximum value at an envelope extension that was less than the arc length; further increase of the extension resulted in a decrease of heat transfer. (Author)

AD-292 623 Div. 25
(TISTM/ODN) OTS price $8.10

Foreign Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATIONS IN THE FIELD OF SURFACE FORCES

(SELECTED ARTICLES).
15 Nov 62, 86p. incl. illus. table, refs.
(Trans. no. FTD-TT-62-429 from Issledovaniya v Oblasti Poverkhnostnykh Sil, Sbornik Dokladov na Konferentsii po Poverkhnostnym Silam, Aprel' 1960, Izdatel'stov Akademii Nauk SSSR, Moskva, pp. 11-16, 48-54, 83-88, 197-231, 1961)
Unclassified report

DESCRIPTORS: *Scientific reports, *Adhesion, *Infrared spectroscopy, *Aerosols, USSR, Surfaces, Polymers, Adhesives, Glass, Particles, Luminescence, Theory, Diffusion, Coagulation.

Contents:
Surface forces and their influence on the properties of heterogeneous systems
Investigation of the adhesion bond of polymers by the luminescence method
Application of infrared-spectroscopy methods for the study of adhesive-underlayer (polymer-glass) interaction
Diffusiophoresis of aerosol particles
On the behavior of a small aerosol particle in a nonuniformly heated mixture of gases
Differential counter for condensation nuclei
A new method of obtaining constant and homogeneous supersaturation
Concerning solution of the kinetic coagulation equation

AD-292 619 Div. 25
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HIGH-POWER GAS-DISCHARGE LAMP,
by I. S. Marshak, V. I. Vasil'yev and others.
15 Nov 62, 4p. (Trans. no. FTD-TT-62-295 from Soviet Patent No. 141219 (667345/24), 20 May 1960)
Unclassified report

DESCRIPTORS: *Gas discharges, *Xenon lamps, *Electric discharges, *Plasma physics, Luminescent materials, Insulating materials, Copper, Steel, Capacitors.

Xenon gas-discharge lamps, designed in accordance with the principles developed by the authors of the invention, are capable of prolonged and dependable operation, even when connected directly into the circuit without current-limiting devices. These lamps make it possible to economize metals and improve the quality of the illumination. Experiments on the performance of xenon lamps have given positive results. (Author)

AD-292 657 Div. 25
(TISTE/CRJ) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT POWER ENGINEERING (SELECTED ARTICLES),
6 Nov 62, 19p. incl. illus. tables, refs. (Trans. no. FTD-TT-61-106 from Teploenergetika, No. 3, pp. 53-56, 62-64, 1961)
Unclassified report

DESCRIPTORS: *Heat transfer, Gas flow, Transport properties, USSR, Translations, Sodium, Calorimeters, Measurement, Mathematical analysis, Copper tubing.

The results of tests on heat transfer of compact checkerboard bundles with constricted cross sections are given. It is shown that these bundles are characterized by considerably higher heat-transfer coefficients than the bundles ordinarily used. The experimental data are generalized, and calculation formulas are proposed for determining the heat-transfer coefficients in ordinary and constricted checkerboard bundles subjected to transverse gas flows. Also presented are the results of an experimental investigation of heat transfer to molten sodium during flow in a circular tube in the range of Pe numbers 18-400 and Re numbers 2400-6400. (Author)

AD-292 661 Div. 25, 9
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION AND CONSTRUCTION OF AN ACCELERATING SYSTEM FOR A LINEAR ACCELERATOR WITH INTENSIVE FOCUSING,
by L. I. Bolotin, V. O. Suprunenko and others.
6 Nov 62, 7p. incl. illus. table, 3 refs. (Trans. no. FTD-TT-62-1329 from Ukrayins'kyy Fizychnyy Zhurnal, 7:2, pp. 132-136, 1962)
Unclassified report

DESCRIPTORS: *Accelerometers, *Linear systems, Focusing, Translations, Electric fields, Beams.

A semiempirical method of calculating an accelerating system of a linear accelerator is described. It was shown, that in final analysis this problem is reduced to studying the distribution of the movable electric field in the gaps along the axis of the system and designations of coefficients, which characterize the effectiveness of accelerating gaps in case of open symmetrical screen tubes and to compare the theoretical calculations with experimental data, obtained by electrolytic bath methods. (Author)

AD-292 665 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF INFRARED LIGHT ON THE LUMINESCENCE OF PURE AND MIXED SILVER HALIDE PHOSPHORI,
by V. M. Bilous and S. I. Golub. 25 Oct 62, 5p. incl. illus. table, 5 refs. (Trans. no. FTD-TT-62-1267 from Ukrayins'kyy Fizychnyy Zhurnal, 6:6, pp. 738-741, 1961)
Unclassified report

DESCRIPTORS: *Silver compounds, *Halides, *Phosphors, *Luminescence, Infrared radiation, Fluorescence, Chlorides, Bromides, USSR.

The effect of infrared (IR) light on the luminescence of pure and mixed silver halide phosphor is discussed. The luminescence was investigated at a temperature of diluted nitrogen. The light spectrum was measured photographically, and the effect of infrared light at various illumination intensities is described. (Author)

AD-292 687 Div. 25
(TISTE/CRJ) OTS price $3.60

Ionosphere Research Lab., Pennsylvania State U. University Park.
NON-LINEAR PLASMA WAVES IN A STREAMING HOMOGENEOUS, COLD IONIZED MEDIUM,
by O. E. H. Rydbeck. 15 Dec 62, 28p. incl. illus. 2 refs. (Scientific rept. no. 175)
(Contract AF 19(604)8012, Proj. 8605)
(AFCRL 62-1093) Unclassified report

DESCRIPTORS: *Plasma physics, *Plasma oscillations, Ionization, Resonance, Ions, Electrons, Space charges, Nonlinear systems, Mathematical analysis.

The research deals with the properties of nonlinear travelling and standing plasma waves in

homogeneous, ionized cold streams. For the travelling non-linear plasma waves it is possible to obtain direct and simple expressions which relate the charge density to the true stream coordinate. This direct method is, unfortunately, not in general applicable to the practically important case of standing plasma waves - a symmetric space charge wave pair in the linear theory. There exists one exception, however, when the direct method can be applied to standing plasma waves, viz. the very special case of stream plasma resonance. Provided there is no electronic overtaking, the indirect, but nevertheless exact, methods of Olving will have to be used. The non-linear maximum charge peaks are shown to be rather similar for the physically otherwise quite different travelling and standing non-linear waves. Both rapidly become very rich in harmonics as overtaking is approached. If such a stream runs through a multi-resonant system an ionized anisotropic medium, or a series of cavities in a microwave device, high harmonics may be excited in the system. (Author)

AD-292 702 Div. 25, 1
(TISTP/JW) OTS price $3.60

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PROPOSED CRITERIA FOR ACOUSTICAL PERFORMANCE OF NOISE SUPPRESSORS.
Report on Reception, Transmission and Reduction of Acoustic Energy by Structures,
by Lothar O. Hoeft. July 58, rev. Nov 62, 30p. incl. illus. tables, 15 refs.
(Proj. 7210)
(AMRL memo. no. M-16) Unclassified report

DESCRIPTORS: *Noise, *Acoustics, Noise analyzers, Analysis of variance, Pressure, Sound ranging, Jet acoustic oscillations, Jet plane noise, Suppressors.

Comparison of the sound pressure levels which result from using the proposed set of average noise reduction criteria with those required to provide protection against hazardous noise exposure, communication interference and adverse community response shows that noise control problems can be solved satisfactorily, simplified and standardized through the use of the criteria. Comparison of the noise reduction spectrum required by the proposed criteria with that which has been measured around existing noise suppressors shows that the proposed criteria are practical. These comparisons have been carried out for both the distant and close fields. The use of the proposed criteria should facilitate the classification of noise suppressors. (Author)

AD-292 709 Div. 25, 7
(TISTM/REB) OTS price $3.60

Westinghouse Electric Corp., Dayton, Ohio.
GALLIUM ARSENIDE DENDRITE SINGLE CRYSTAL PROGRAM.
Interim technical documentary progress rept. no. 3, 24 Aug-24 Nov 62.
24 Nov 62, 21p. incl. illus. 3 refs.
(Contract AF 33(657)8162)
Unclassified report

DESCRIPTORS: *Gallium compounds, *Arsenides, *Single crystals, *Solar cells, Crystals, Crystal ovens, Intermetallic compounds, Growth, Materials.

Dendritic GaAs material has been obtained from a 7-in. exploratory pulling furnace. The techniques learned for stoichiometry and temperature control are being applied in the construction of a 14- and a 24-in. pulling furnace. Reproducibility of results has been improved in the open-tube diffusion process. Detection of partial surface conversion of GaAs to GaP by a reflection method has been explored. (Author)

AD-292 714 Div. 25
(TISTP/TL) OTS price $7.60

General Electric Co., Schenectady, N. Y.
STUDY OF THE INTERACTION BETWEEN ELECTROMAGNETIC FIELDS AND PLASMAS.
Final rept., 1 Oct 61-1 Oct 62,
by K. B. Persson and J. M. Anderson. 15 Sep 62, 70p. incl. illus. tables, 22 refs.
(Contract AF 19(628)247, Proj. 4619)
(AFCRL 62-906) Unclassified report

DESCRIPTORS: *Plasma physics, *Gas discharges, *Electromagnetic fields, Low frequency, Gases, Gas ionization, Xenon, Krypton, Vacuum systems, Aluminum compounds, Electrons, Ions, Gas flow, Nozzles, Hall effect, Helium, Pressure, Neon, Argon, Velocity.

A pulsed, low-frequency bridge, where interaction with a plasma column is by a solenoidal electric field, is utilized to measure the decaying conductivity following a pulsed electrical discharge in xenon and krypton. Attainment of a minimum residual gas pressure in the vacuum system approximately 5 x 10 to the -11th power Torr with an oil diffusion system pump and traps of alumina pellets is described. A theoretical treatment of non-linear ambipolar diffusion indicates that the limiting velocity for electron-ion flow is the isothermal or adiabatic sound velocity as found at the exit of a nozzle. Bohm's criterion is a natural consequence of this theory. The Hall effect in the positive column established in helium, neon, and argon is examined and the electron drift velocity, so found, compares favorably with other independent determinations. (Author)

AD-292 716 Div. 25, 9
(TISTP/JW) OTS price $1.10

Israel Inst. of Tech., Haifa.
THE TRANSMISSION OF AUDIO-FREQUENCY ELECTROMAGNETIC WAVES THROUGH THE TERRESTRIAL IONOSPHERE IN THE MAGNETO-IONIC MODE,
by C. Altman and H. Cory. 25 Apr 62, 10p. incl. illus. tables, 10 refs. (Technical rept. no. 2)
(Contract AF 61(052)555)
(AFCRL 62-797) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Ionospheric propagation, *Terrestrial magnetism, Fluid flow, Density, Diurnal variations, Refraction, Energy, Audiofrequency, Transmission.

Results reported in Technical Report No. 1 are extended to night-time conditions. It is found that both by day and by night a total ionospheric transmission optimum in the neighbourhood of 3-5 kc/s exists for whistler mode propagation. Results are consistent with experimental values of Storey. (Author)

AD-292 738 Div. 25
(TISTP/TL) OTS price $1.60

Queen Mary Coll., U. of London (Gt. Brit.).
GEOMAGNETIC CONTROL OF DIFFUSION IN THE F2 REGION OF THE IONOSPHERE. 1. THE FORM OF THE

DIFFUSION OPERATOR,
by P. C. Kendall and J. E. C. Gliddon.
27 Mar 62, 12p. (Technical note no. 1)
(Grant AF-EOAR 61-41)
(AFCRL 62-1061) Unclassified report

DESCRIPTORS: *Terrestrial magnetism, *Ionosphere, Diffusion, Control, Electrons, Geophysics, Earth, Partial differential equations, Operators (Mathematics), Tables.

The mathematical form of the diffusion operator is derived for motion of electrons along the lines of force of a dipole approximation to the geomagnetic field. The earth's atmosphere is assumed to be isothermal and horizontally stratified. A table is given of the various forms of the diffusion operator in different independent coordinates. The results are applied briefly to a discussion of the form of the boundary condition at great height in the F2 region. (Author)

AD-292 762 Div. 25, 20
(TISTM/EJH) OTS price $1.60

Ecole Normale Superieure (France).
RADIATION ENHANCED DIFFUSION IN SILICON. 2. DESIGN OF A MICROCALORIMETER. STORED ENERGY MEASUREMENT IN IRRADIATED GERMANIUM. 3. STUDY OF DEFECT MOBILITY IN IRRADIATED GERMANIUM.
Annual summary rept. no. 1,
by J. C. Pfister and P. Baruch and others.
25 July 62, 16p. incl. illus.
(Contract AF 61(052)543)
(AFCRL 62-788) Unclassified report

Presented at the Kyoto Conference on Lattice Defects, Sep 62.

DESCRIPTORS: *Silicon, *Germanium, *Semiconductors, Electron bombardment, Proton bombardment, Neutron bombardment, Diffusion, Impurities, Energy, Storage, Heat transfer, Solid state physics, Calorimeters, Test equipment, France, Radiation effects.

Radiation enhanced diffusion of impurities has been studied on silicon irradiated at high temperatures (800 to 1100 C) by 250-1000 kev protons. Electrically active impurities, as shown by position of p-n junctions, diffuse faster in irradiated regions. A point defect mechanism is proposed, and a diffusion coefficient of the active defect is obtained. A cryostat and calorimeter were designed for a stored energy measurement in germanium irradiated at 20 K by 2 Mev electrons. Problems of heat transfer and insulation are discussed. Radiation induced defects have been shown, in former work, to drift in the electric field of a p-n junction, irradiated with electrons or gamma-rays. The same effect occurred with neutron irradiation. (Author)

AD-292 797 Div. 25
(TISTP/TL) OTS price $5.60

Stanford Electronics Labs., Stanford U., Calif.
OBSERVATIONS OF COLLECTIVE PHENOMENA IN PLASMAS,
by K. I. Thomassen. Oct 62, 49p. incl. illus. table, 7 refs. (Rept. no. SEL-62-143; Technical rept. no. 251-3)
(Contract AF 49(638)660)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electrons, Electromagnetic waves, Dielectrics, Resistance, Oscillation, Stability, Radiofrequency, Bessel functions, Integral transforms, Theory.

The objective of this research was to find experimental evidence of an 'anomalous' resistance in plasmas. Anomalous resistance results when collective action by electrons causes randomization of the growing oscillations in the two-stream instability. This sequence of events leading to dissipation of energy was predicted several years ago by Buneman. It is believed that this objective was achieved (i.e., that anomalous resistance is evidenced by observations to be reported here), on a high density plasma subjected to r-f fields by a cavity resonant at a frequency well below the plasma frequency. With sufficient r-f power and density, the two-stream instability should be excited to turbulence level during each half-cycle, causing irreversible power loss. Calculations enumerating the necessary conditions for observing the phenomena were made, showing that the resistance can easily be seen above the intrinsic cavity loss using very moderate amounts of power. (Author)

AD-292 905 Div. 25, 20
(TISTP/JW) OTS price $1.60

Sarah Mellon Scaife Radiation Lab., U. of Pittsburgh, Pa.
MAGNETIC AND STRUCTURE PROPERTIES OF SOLIDS AND SOLUTIONS.
Final rept., 1 Jan 58-31 Oct 62,
by F. Keffer, J. H. Anderson and T. Holstein.
31 Oct 62, 14p.
(Contract AF 49(638)323; Continuation of Contract AF 18(600)892)
Unclassified report

DESCRIPTORS: *Solids, *Crystals, Spin, Resonance, Optics, Electrons, Nuclear resonance, Bibliography, Magnetic properties.

The aim of this research is to increase our understanding of the relationship between the electron and magnetic properties of solids and their crystal structures. The work was experimental and theoretical. Basic experimental techniques included nuclear quadrupole resonance, optical absorption, and electron spin resonance. (Author)

AD-292 911 Div. 25
(TISTP/WH) OTS price $5.60

Davos Observatory (Switzerland).
COMPARISON OF MEASURED AND THEORETICAL VALUES OF THE SPECTRAL INTENSITY OF ULTRAVIOLET SKY RADIATION,
by Paul Bener. Sep 62, 55p. incl. illus. tables, 14 refs. (Technical note no. 1)
(Contract AF 61(052)618)
(AFCRL 62-1115) Unclassified report

DESCRIPTORS: *Ultraviolet radiation, *Spectrophotometers, *Intensity, *Sky, *Sky brightness, Data, Measurement.

Contents:
The method of measurement
The measured intensity of ultraviolet sky radiation from angular elevations greater than or equal to 20 degrees
The theoretical values of the spectral intensity of ultraviolet sky radiation from angular elevations = 20 degrees.
The extraterrestrial intensity of solar radiation between 300 and 410 m micron according to different authors
Results of a more detailed evaluation of the spectral distribution of ultraviolet sky radiation
Comparison of the measured and computed values for summer conditions

Comparison of the measured and computed intensity for winter conditions
Possible causes of the discrepancies found between the results of measurement and theory

AD-292 921 Div. 25
(TISTM/ODN) OTS price $5.60

Naval Ordnance Lab., Corona, Calif.
THE PHASE SHIFT OF THE HARMONIC OUTPUT OF TRIGLYCINE SULFATE AS A FUNCTION OF THE SIGN OF POLARIZATION,
by D. J. White. 1 Nov 62, 58p. incl. illus. tables (NOLC rept. no. 568)
Unclassified report

DESCRIPTORS: *Ferroelectric materials, *Ferroelectric crystals, *Harmonic analysis, Phase measurement, Phase shifters, Polarization, Single crystals, Sulfates, Theory, Glycines, Voltage, Oscillographs, Amplitude modulation, Mathematical analysis.

A ferroelectric driven in a suitable circuit by a sinusoidal voltage will produce all harmonics of the driving field. A simple theory is developed to show that there is 180-deg phase shift for all even harmonics if the sign of the ferroelectric polarization is reversed, and no phase shift for odd numbered harmonics. Experimentally, single crystal triglycine sulfate conforms rather well to the simple theory, with the deviations at least qualitatively explicable. The 180-deg phase shift in the second harmonic has been suggested as a means of nondestructive readout for ferroelectric memory elements. The second harmonic amplitude appears ample for this purpose but is dependent on the crystal polarization history. It also appears that knowledge of the harmonic outputs of ferroelectrics under the influence of a driving field could be a valuable tool in the investigation of ferroelectrics and ferroelectricity. (Author)

AD-292 924 Div. 25, 9
(TISTP/JW) OTS price $13.50

Munich U. (Germany).
THEORETICAL INVESTIGATION ON ENERGY GAIN BY ABSORPTION OF SOLAR RADIATION IN CLOUDS.
Final technical rept., 1 Jan 61-30 Sep 62,
by Gunther Korb and Fritz Moller. 30 Sep 62, 185p. incl. illus. tables, refs.
(Contract DA 91-591-EUC-1612)
Unclassified report

DESCRIPTORS: *Solar energy, Absorption, Clouds, Atmospherics, Moisture, Heat transfer, Albedo, Optics, Radiation effects.

The absorption of solar radiation within natural atmospheric clouds, consisting of pure water droplets, is investigated in order to determine one term of the atmospheric heat balance, the knowledge of which becomes more and more necessary for numerical weather prediction. The amount of solar energy absorbed by artificial carbon clouds spread into the atmosphere by aircraft, as well as the absorption of water clouds seeded with carbon particles, is determined. The solution of the latter problem gives information about the possibility of an artificial influencing of the atmospheric heat balance. (Author)

AD-292 939 Div. 25
(TISTP/JW) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
OBSERVATION OF INSTABILITIES IN A PLASMA INJECTED INTO A Bz FIELD,
by Alan J. Toepfer. 1 Nov 62, 15p. incl. illus. 5 refs. (Rept. no. TDR-169(3210-02)TN-1)
(Contract AF 04(695)169)
(SSD TDR 62-146) Unclassified report

DESCRIPTORS: *Plasma physics, *Photographic analysis, Magnetic fields, Ionization, Stability, Oscillators, Helium, Instrumentation, Density.

Photographic observations were made of a plasma blob injected into a non-varying axial magnetic field. The plasma was axially confined for periods of time up to three microseconds, after which instabilities developed. Radial accelerations of the plasma-magnetic field boundary were estimated to be an order of magnitude less than in recent theta pinch experiments. Initial conditions at the plasma-magnetic field boundary indicate the possibility of the development of the flute, or interchange, instability. (Author)

AD-292 961 Div. 25, 9
(TISTP/JW) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
STEADY STATE HEAT CONDUCTION IN A CIRCULAR CONE,
by Subhendu K. Datta. Oct 62, 14p. incl. illus. 3 refs. (MRC Technical summary rept. no. 347)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Conductivity, *Heat transfer, Heat exchangers, Conical bodies, Temperature, Surfaces, Functions, Special functions, Boundary layers, Partial differential equations.

The steady state heat conduction in a circular cone when a finite region of the surface of the cone is heated to a certain temperature is studied. The temperature at a point in this region is supposed to be a function of the distance from the vertex of the cone. The solution has been given in series form as also in real integral form. The distribution of temperature on the axis of the cone has been plotted for a particular semi-opening angle of the cone. (Author)

AD-292 978 Div. 25
(TISTP/WH) OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
ON THE NONLINEAR THEORY OF ELASTIC SHELLS UNDER THE KIRCHHOFF HYPOTHESIS,
by P. M. Naghdi and R. P. Nordgren. Aug 62, 17p. 15 refs.
(Technical rept. no. 17; Series no. 131, Issue no. 17)
(Contract Nonr-22269, Proj. NR 064-436)
Unclassified report

DESCRIPTORS: *Elastic shells, *Stresses, *Deformation, *Nonlinear systems, Mathematical analysis.

The analysis is concerned with an exact, complete, and fully general nonlinear theory of elastic shells founded under the Kirchhoff hypothesis (Arch. Rat'l Mech. and Anal., 1:295-323, 1958). Since the fully general equations of equilibrium in terms of stress and couple resultants and the appropriate boundary conditions are well known, the main task is the determination of suitable strain measures and the derivation of constitutive equations. (Author)

AD-293 240 Div. 25
(TISTM/ODN) OTS price $2.60

Uppsala U. (Sweden).
STUDIES ON THE ALTERNANT MOLECULAR ORBITAL METHOD. IV. GENERALIZATION OF THE METHOD TO STATES WITH DIFFERENT MULTIPLICITIES,
by Ruben Pauncz. 1 Aug 62, 28p. incl. tables, 9 refs. (Technical note no. TN 82)
(Contract AF 61(052)351)
(ARL 62-469)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Atomic energy levels, *Atomic orbitals, Electrons, Nuclear shell models, Theory, Functions, Benzenes, Spin, Energy, Solid state physics, Mathematical analysis, Integrals, Atoms, Configuration, Carbon, Tables.

A general formulation of the alternant molecular orbital method, applicable to states of different multiplicities in systems with an even number of atoms, is presented. The treatment is formulated in such a way that the same integral sums appear in the energy expression for the states belonging to different multiplicities. The resultant energy expressions show a simple dependence on the mixing parameter (Lambda). Application to cyclic systems shows that the best lambda values decrease slowly with increasing multiplicity. Comparison with the configuration interaction treatment reveals that the AMO method corresponds to a restricted CI treatment, but it is capable of yielding a considerable part of the energy improvement obtained by the latter method. (Author)

AD-293 248 Div. 25
(TISTM/REB) OTS price $1.10

Lincoln Lab., Mass Inst. of Tech., Lexington.
MASS SPECTROGRAPHIC EVIDENCE FOR DEVIATIONS FROM STOICHIOMETRY IN GaSb,
by Edward B. Owens and Alan J. Strauss. 1962, 9p. incl. illus. 10 refs.
Unclassified report

DESCRIPTORS: *Gallium compounds, *Antimonides, *Crystal structure, Chemical impurities, Mass spectroscopy, Lattices.

The purest GaSb now made is p-type. At room temperature this material contains free holes at concentrations between 1 and 2 x 10 to the 17th power per cc. In order to obtain additional evidence concerning whether the acceptors are impurity atoms or lattice defects associated with deviations from stoichiometry, GaSb has been analyzed with a spark source mass spectrograph which our calibration shows to be capable of detecting almost all impurity elements which are present at concentrations exceeding 1 x 10 to the 16th power per cc. The only elements detected besides Ga and Sb were: (1) Si at a concentration of 5 x 10 to the 16th power per cc or less and (2) C, O, H, and N, the levels of which were comparable to those obtained in blank runs, so that their concentration in the GaSb cannot be estimated. Of the latter elements, only carbon is likely to be a shallow acceptor in GaSb, and metallurgical evidence indicates that it should not be present at constant concentration in purified material. The analytical results therefore strongly increase the probability that the acceptors are lattice defects rather than impurity atoms. (Author)

AD-293 266 Div. 25
(TISTM/ODN) OTS price $3.60

Raytheon Co., Waltham, Mass.
FAILURE MECHANISMS IN FERROELECTRIC AND NON-LINEAR DIELECTRICS,
by H. H. Barrett, P. B. Nutter, and W. M. Winter. Oct 62, 27p. incl. illus. table, 10 refs.
(Technical note no. 2; rept. no. S-479)
(Contract AF 30(602)2678)
(RADC TDR 62-548) Unclassified report

DESCRIPTORS: *Dielectrics, *Strontium compounds, *Titanates, *Ferroelectric materials, *Single crystals, Diffusion, Oxygen, Test equipment, Electrical conductance, Voltage, Resistance, Pulse generators, Electric fields, Dielectric properties, Gases, Pressure, Circuits, Silver electrodes, Failure (Mechanics), Conductivity, Electrical properties.

The electrostrictive constant and the elastic constant have been measured in the paraelectric region for SrTiO3 over the temperature range from 77 to 300 K, which includes both above and below the 110 K phase transition. Conductivity at high fields has been measured under dc conditions and proved to be severely nonohmic. Apparatus for measurements of breakdown voltages under pulse or dc conditions is described and preliminary measurements of breakdown voltages are reported. Studies of oxygen diffusion in annealed and unannealed single crystal SrTiO3 have been started. (Author)

AD-293 268 Div. 25, 16
(TISTM/ODN) OTS price $1.60

Uppsala U. (Sweden).
THE ENERGY BAND STRUCTURE OF POLYNUCLEOTIDES IN THE HUECKEL APPROXIMATION,
by J. Ladik and K. Appel. 15 May 62, 11p. incl. tables, refs. (Technical note no. 78)
(Contract AF 61(052)351)
(ARL 62-480) Unclassified report

DESCRIPTORS: *Nucleotides, *Nucleic acids, Energy, Polynomials, Adenine, Guanine, Theory, Mathematical analysis.

Taking as model systems the polynucleotides poly A, poly T, poly G, poly C and poly U in a stereo arrangement according to the Watson-Crick model of DNA, the energy bands of these macromolecules were calculated in the Hueckel approximation. Simple polynomial expressions were found for the energy values as functions of cos k and with the aid of these the limits of all the occurring energy bands were determined. Some features of the obtained band structures are discussed. (Author)

AD-293 280 Div. 25
(TISTM/ODN) OTS price $1.60

Colorado School of Mines, Golden.
COUPLING PERTAINING TO A STEEL SPHERE IMPACTING THE ENDS OF RODS OF VARIOUS MATERIALS,
by John S. Rinehart. Nov 62, 14p. incl. illus. table.
(Contract N123-(60530)23585A)
(NAVWEPS rept. no. 8064; NOTS TP 3069)
Unclassified report

DESCRIPTORS: *Metals, *Polymers, Couplings, Rods, Steel, Spheres, Acrylic resins, Strain gages, Stresses, Aluminum, Brass, Copper, Acoustic impedance, Impact shock.

A method of measuring coupling between an energy source and a material has been developed, and some preliminary tests have been performed. Elastic waves were introduced into metal and Plexiglas rods by impacting one end of each kind of rod with a steel sphere. The strain pulses produced in the rods were sensed by resistance strain gages cemented to the sides of the rods and recorded on an oscilloscope. The respective

peak strains, pulse durations, peak stresses, momenta, and energies of the strain pulses were then related to the respective mass densities, specific acoustic resistances, and Young's moduli in order to gain some familiarity with the parameters that control coupling. Excellent correlation was found between the momentum in the pulse and the Young's modulus of the material. Reasonably good correlation was found with several of the other parameters. However, the results of the tests indicate that the technique, while having some merit for the study of coupling between impacting spheres and long rods, does not appear particularly useful for the study of coupling between explosives and rocks. (Author)

AD-293 291 Div. 25, 14, 4
(TISTM/EJH) OTS price $3.60

Polymer Research Inst., U. of Mass., Amherst.
THE CRYSTALLINITY OF POLYOLEFINS,
by Sadao Hoshino and Kiichiro Sasaguri. 1 Aug 62, 10p. illus. tables, 13 refs. (Technical rept. no. 50)
Unclassified report

DESCRIPTORS: *Crystallization, *Polymers, *X-ray diffraction analysis, Measurement, Spectrographic analysis, Ethylenes, Propenes, Crystals, Mathematical analysis, Theory.

Recently a new and simple method for determination of crystallinity of polyethylene and polypropylene was presented by P. H. Hermans and his co-worker. In this laboratory, his method was applied to some samples of polyethylene and polypropylene, and the results compared with other data obtained by means of x-ray and infrared absorption methods. The method consists of an adoption of quantities proportional to the crystalline and amorphous contents, and obtaining a linear relationship between them applicable to other samples. In the case of polyethylene the integrated intensity of the (110) and (200) peaks was selected as a quantity proportional to the crystalline region and the integrated area or height of amporphous peak at theta = 19.60 degrees for that of the amorphous region. (Author)

AD-293 401 Div. 25
(TISTP/TL) OTS price $1.75

Technical Research Group, Syosset, N. Y.
RESONANCES OF THE FABRY-PEROT LASER,
by S. R. Barone. Oct 62, 1v. incl. illus. 7 refs. (Scientific rept. no. 1)
(Contract AF 19(604)8817, Proj. 4645)
(AFCRL 62-778) Unclassified report

DESCRIPTORS: *Interferometers, *Lasers, Cavity resonators, Personnel, Quantum mechanics, Oscillation, Wave transmission, Refraction, Absorption, Optics, Integral equations, Matrix algebra, Scattering, Frequency.

The optical mode structure of a Fabry-Perot interferometer-resonator composed of two infinite strip mirrors is investigated from the point of view of the general theory of non-spectral resonances. It is shown that the classical description of this configuration is inadequate to describe its response to highly monochromatic LASER radiation and must be supplemented by a discussion of the transverse resonance behavior. This introduces a fine structure to the classical Fabry-Perot rings and implies a discrete resonance behavior for the Fabry-Perot interferometer. In analogy to the characterization of quantum mechanical virtual levels by wave functions and complex energies it is convenient to characterize the discrete resonances of a Fabry-Perot by mode functions and complex resonant frequencies. On the basis of a reformulation and asymptotic expansion of a previously given stationary expression it is shown that in the high frequency limit the open sides of the structure can be replaced by an effective impedance boundary condition. the solution of an elementary resonance problem then yields analytic approximations for the mode shapes, characteristic oscillation frequencies, and modal lifetimes. In the common domain of validity these results are in excellent agreement with previous numerical work on this problem. (Author)

AD-293 411 Div. 25
(TISTP/JW) OTS price $1.60

Northeastern U., Boston, Mass.
CALCULATION OF THERMOPOWER FACTORS FOR A PLASMA AND A METAL,
by Jack Davis and Giovanni Lanza. 1 Nov 62, 14p. 4 refs. (Scientific rept. no. 3)
(Contracts AF 19(604)7358 and AF 19(604)8462)
(AFCRL 62-1047) Unclassified report

DESCRIPTORS: *Thermocouples, *Plasma physics, Special fractions, Relaxation time, Thermal utilization, Temperature, Equilibrators, Electrical properties, Transport properties.

AD-293 420 Div. 25
(TISTP/JW) OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INVESTIGATION OF NON-THERMAL IONIZATION FOR MHD ENERGY CONVERSION.
Quarterly rept. no. 3, 15 Sep-15 Dec 62,
by George W. Sutton. 15 Dec 62, 29p. incl. illus. table.
(Contract AF 33(657)8298)
Unclassified report

DESCRIPTORS: *Ionization, *Gas discharges, *Discharge tubes, Cesium, Potassium, Vapors, Helium, Electrons, Ions, Magnetohydrodynamics.

AD-293 426 Div. 25, 20
(TISTP/JW) OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
DEVELOPMENT OF X-RAY FLUORESCENCE ANALYSIS TECHNIQUES FOR SMALL SAMPLES: A PROTOTYPE ATMOSPHERIC ELECTRON PROBE.
Final rept.,
by T. O. Passell, J. B. Swedlund, and S. L. Tsimuty. 31 Oct 62, 69p. incl. illus. tables, 25 refs.
(Contract AF 19(604)8827, Proj. 4619)
(AFCRL 62-933) Unclassified report

DESCRIPTORS: *X ray diffraction analysis, *Solid state physics, Electron diffraction analysis, Atmospherids, Ruby, Chromium, Fluorescence.

Improved techniques of x-ray fluorescence analysis were applied to some difficult analytical problems of current interest in solid state physics. The chromium content of a ruby was determined at the concentration level of 0.03 mole percent with a net signal to background ratio of 5. The volume resolution was approximately 1 cu mm. This was accomplished with a standard Norelco goniometer and x-ray tube with a lithium fluoride analyzer crystal curved to obey Rowland circle focussing conditions for Cr K alpha, a helium x-ray path within the spectrometer, and a scintillation detector. A prototype atmospheric electron probe was built and

tested for use in exciting fluorescent x-rays. Both conducting and insulating solids can be readily analyzed at atmospheric pressure with this probe. Electrons of 25 to 50 kev energy pass through a vacuum tight carbon window sq cm before arrival at the specimen. A relatively crude feasibility test on a pure nickel specimen gave 380 counts/sec at the Ni K alpha peak from a 15 micro amp primary electron beam at 25 kev initial energy. (Author)

AD-293 432 Div. 25, 10
(TISTP/WH) OTS price $12.00

Daniel, Mann, Johnson and Mendenhall, Los Angeles, Calif.
AIR DISPERSION OF ROCKET EXHAUST.
Final rept., 1 Aug 61-31 Oct 62.
Oct 62, 155p. incl. illus. tables.
(Contract AF 04(611)7540)
(SSD TDR 62-136) Unclassified report

DESCRIPTORS: *Rocket motors, *Exhaust gases, *Diffusion, *Meteorology, *Toxicity, *Propellants.

An analysis of the ability of the atmosphere to dissipate toxic exhaust products from a rocket test system was performed. The analysis covered dispersion, stack height, total integrated dosage, inversion layer penetration, and sampling and weather data systems. Methods for determining toxicity levels downwind of a toxic emission were developed. The conditions for safely releasing various quantities of toxic materials were defined for various types of rocket firings. (Author)

AD-293 438 Div. 25
(TISTP/WH) OTS price $5.60

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
Interim scientific rept. no. 3, 15 Sep-15 Dec 62.
15 Dec 62, 1v. incl. illus. table, 20 refs.
(Contract AF 33(657)8311)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Magnetic fields, *Gas ionization, *Combustion, *Rocket propulsion, Cesium, Helium, Tantalum.

Contents:
Status of closed loop auxiliaries
Magnets for motor and generator sections
Magnet current regulators
Final design of cesium feed and bleed systems with incorporated safety features
Hall voltage guard electrodes
Enhanced ionization utilizing chemical disequilibrium
A 3/4 in. x 3/4 in. straight through MHD generator
Closed loop generator duct simulator
Objectives of testing with straight through generator
Generalized summary of test results
Compatibility of tantalum and cesium
Fail safe features of cesium-helium feed and bleed system
Electric power failure
Loop duct burnthrough
Tap water failure
Variations in duct pressure at the bleed point
Water flow blockage downstream of scrubber

AD-293 440 Div. 25, 15
(TISTW/PCR) OTS price $3.60

RAND Corp., Santa Monica, Calif.
STRESS POTENTIALS, PATH DENSITIES AND RELATIVISTIC THERMODYNAMICS,
by Dominic G. B. Edelen. Dec 62, 33p. 3 refs.
(Memo. no. RM-3433-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Stresses, *Thermodynamics, *Relativity theory, Mathematical analysis, Energy, Temperature, Entropy, Integral equations, Matrix algebra, Particle trajectories, Differential equations.

The requirements which result in general relativistic stress potentials are shown to provide additional constitutive information concerning the properties of material bodies. The path density, which defines the intrinsic energy of a body, is shown to be path independent in an appropriate sense if the generalized stresses admit a stress potential. This suggests a decomposition of the generalized stresses, and specific integrability conditions are obtained for such decompositions. Fundamental differential relations on the trajectories of the energy flux field are obtained, and these are shown to result in natural definitions of temperature and entropy together with a statement of the second law of thermodynamics. (Author)

AD-293 445 Div. 25
(TISTM/EJH) OTS price $4.60

Keck, W. M., Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
DISLOCATION MOBILITY IN ZINC SINGLE CRYSTALS.
Final technical rept.,
by K. H. Adams and T. Vreeland, Jr. Dec 62, 36p. incl. illus. 4 refs.
(Contract Nonr-22037, Proj. NR 031 677)
Unclassified report

DESCRIPTORS: *Zinc, *Single crystals, *Deformation, Metallic crystals, Shear stresses, Chemical etching, Density, Configuration, Loading, Test methods.

Results of a study of dislocation mobility in high purity zinc single crystals are presented. Dislocation positions were determined using a special etching technique, and the dislocation density and configuration were determined before and after static loading and stress pulse loading. Loading at stress levels slightly below the flow stress produced local dislocation rearrangement, with the maximum dislocation displacement somewhat less than the sub-boundary spacing. At the flow stress dislocations penetrate the sub-boundaries and relatively large dislocation displacements are indicated (comparable to the specimen dimensions) in stress pulse tests of approximately 30 sec duration. Short duration stress pulse loading at a stress level approximately 70 times the flow stress produced a maximum dislocation velocity of approximately 6 per cent of the shear wave velocity. (Author)

26. PRODUCTION AND MANAGEMENT

AD-292 181 Div. 26
(TISTM/EJH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF CLEANING ROLLED MATERIAL OF SCALE,

by L. A. Yutkin and L. I. Gol'tseva. 30 Oct 62, 3p. (Trans. no. FTD-TT-62-1295 from Patent 114172, Appl. no. 586042/48a, 103:pp. 1-2, 12 Nov 62)
Unclassified report

DESCRIPTORS: *Metals, *Scale, *Processing, Cleaning, Electric discharges, Abrasives, Solutions, Shock waves, Rolling mills, USSR.

AD-292 207 Div. 26, 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INSTALLATION FOR REMOVING SINTER FROM THE SURFACE OF A STEEL HOT-ROLLED BAND WITH ABRASIVE MATERIAL,
by V. A. Kolenko, L. A. Yutkin and others. 29 Oct 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1291 from Patent 114646, Appl no. 591013/48a, 103, pp. 1-3, 28 Jan 58)
Unclassified report

DESCRIPTORS: *Steel, *Surfaces, *Electric discharges, Electroerosive machining, Sintering, Abrasives, Hammers, Reflectors, Metal films, Spark machining, USSR, Cleaning.

There are installations and methods known for thermo-electrolytic and hydroelectro-mechanical cleaning of sinter from metal tapes by means of electrical discharges, which originate between the surface to be cleaned and the dischargers. A feature of the installation under consideration lies in the fact that it is accomplished as a metallic bath with spark discharges in it, with reflectors, sockets, located above the band to be cleaned and restricting its position in the bath, with rollers, which direct the band, and armature pipes, passing across the bath and protecting the high-voltage cable. (Author)

AD-292 215 Div. 26, 25
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN PROBLEMS CONCERNING THE EFFECT OF THERMAL DEFORMATIONS OF MACHINE UNITS OF PRECISION GRINDING ON THE MACHINING ACCURACY,
by F. P. Duzhenkov. 29 Oct 62, 14p. incl. illus. tables, 2 refs. (Trans. no. FTD-TT-62-1285 from Trudy no. 52, Aviatsionnyy Tekhnologicheskiy Institut. Nekotoryye Voprosy Sovremennoy Tekhnologii Priborostroyeniya, no. 52, pp. 61-72, 1961)
Unclassified report

DESCRIPTORS: *Precision finishing, *Grinders, *Machining, Effectiveness, Thermal stresses, Deformation, Lathes, Friction, Cutting tools, Machines, Machine tools, Temperature, USSR.

Because of such high requirements, tooling parts must be machined on precision grinding lathes. The machined units are affected by thermal deformations, which in turn affect the accuracy of machining. Certain problems are discussed. (Author)

AD-292 233 Div. 26, 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BASIC DATA ON VIBRO-ARC SURFACING,
by A. A. Spiridonov and A. A. Semkin. 29 Oct 62, 13p. incl. illus. tables (Trans. no. FTD-TT-62-1250 from Novoye Oborudovaniye Dlya Avtomaticheskoy Vibrodugovoy, Moscow-Sverdlovsk, Mashgiz, pp. 5-14, 1961)
Unclassified report

DESCRIPTORS: *Surfaces, *Finishes, *Electroerosive machining, *Vibration, Metals, Alloys, Vibration mechanisms, Machining, Industrial equipment, Test methods, Lathes, Cutting tools, Cutting torches, Switching circuits, USSR, Electrodes.

The nature of the vibro-arc surfacing method is described. The head for automatic surfacing is mounted on lateral slides of the support instead of the tool holder. During the process of surfacing the detail revolves at a rate which is fixed within limits of from 0.5 to 15 rpms, depending upon the diameter of the surfaced detail, rate of wire melting, and thickness of built up layer. The head has a special mechanism for feeding the wire. A liquid protects the surfacing zone from atmospheric oxygen and nitrogen and cools the beaded detail. By the vibration of the wire it is possible to reduce the harmful effect of the liquid on the stability of arc burning process. (Author)

AD-292 295 Div. 26, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
MECHANICAL AND CORROSION PROPERTIES OF VASCOJET 1000 RIVETS.
Report on Materials - Alloy Steel - Ultra-High Strength H-11 Hot Work Die Steel - Vascojet 1000 (Vanadium Alloy Steel Co.) Rivet Shear Strength and Corrosion Resistance,
by H. H. Stier. 2 Feb 59, 7p. incl. illus. tables, 1 ref. (Rept. no. MP 58-238)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Rivets, *Steel, Mechanical properties, Heat treatment, Tensile properties, Alloys, Aluminum alloys, Sheets, Sea water, Salts, Sprays, Corrosion, Hardness, Shear stresses, Wire, Tests.

Annealed Vascojet 1000 steel rivets were cold headed from 1/8 and 1/4 inch diameter rivet wire and then heat treated. The heat treatment consisted of 1800 F for 30 minutes, air cool, 1150 F for 1-1/2 hours, air cool, 1150 F for 1-1/2 hours, air cool. The ultimate tensile strength after heat treatment of the 1/8 and 1/4 inch diameter wire was 200.7 and 191.4 ksi, respectively. Tandem protruding head rivets spaced at 4 rivet diameters, held to 2 rivet diameter minimum edge distance, and driven to head diameters about 1.5 times shank diameters were driven into 0.125 inch thick clad 7075-T6 aluminum alloy sheet lap shear joints and tested. In these tests the 1/8 inch diameter rivets yielded (0.005 inch offset at 1638 pounds and failed at 1765 pounds with an ultimate strength of 136.2 ksi, and the 1/4 inch diameter rivets yielded (0.00625 inch offset) at 5767 pounds and failed at 6275 pounds with an ultimate strength of 121 ksi. Salt spray corrosion tests with riveted joints indicated that corrosion damage to clad 7075-T6 sheet is accelerated by the presence of unprotected Vascojet 1000 steel rivets. (Author)

AD-292 655 Div. 26, 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF FORGING BY EXPLOSION,

by B. N. Zyablov, V. A. Maslyanikov and others. 30 Oct 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1293 from Patent 141472, Application No. 666020/25/7c, 14, 49h, 11, pp. 1-3, 21 Nov 1960)
Unclassified report

DESCRIPTORS: *Forging, *Explosive forming, *Explosions, Manufacturing methods, Production, Test methods, Sheets, Metals, Alloys, USSR, Foam rubber, Plastics.

Explosive forging of items from metal, done according to the proposed method, does not require the use of matrices. Between the charge and the blank, a layer composed of a porous material (foam-rubber, plastic, sponge rubber and others) is placed in a hollow chamber, according to the shape, corresponding to the shape of the stamp-out, and conversely, according to the relation to the charge; the sides of the blank are placed according to the shape of the stamp-out in a hollow chamber or a body composed of a porous material. (Author)

AD-293 099 Div. 26, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
STRENGTH AND DRIVING CHARACTERISTICS OF COLD HEADED RIVETS.
Report on Material-Titanium Alloy-Ti-13V-11Cr-3Al,
by H. Stier, P. W. Bergstedt, and H. C. Turner. 24 Nov 58, 6p. incl. illus. tables (Rept. no. 8926-002)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Rivets, *Titanium alloys, *Riveted joints, Alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Steel, Shear stresses, Heat treatment, Stresses, Deformation, Mechanical properties, Tensile properties, Corrosion.

Three-sixteenths inch diameter cold headed flat-head Ti-13V-11Cr-3Al (B-120-VCA) titanium alloy rivets were fastened into 0.043 inch thick 4130 steel strips heat treated to 180,000 to 200,000 psi ultimate tensile strength. Ultimate shear strengths of 109,000 to 100,000 psi were developed by gun driving and squeezing cold headed rivets and by gun driving cold headed and annealed rivets. Severe cold working during cold heading caused rivet breakage during driving, but this was relieved by vacuum annealing prior to driving. (Author)

AD-293 224 Div. 26, 4
(TISTM/ODN) OTS price $1.25

Isomet Corp., Palisades Park, N. J.
DESIGN AND DEVELOPMENT OF REGENERATIVE CARBON DIOXIDE SORBERS.
Final rept., 1 Mar 61-28 Feb 62 on Equipment for Life Support in Aerospace,
by Horace W. Chandler, Eugene McDonald and others. Nov 62, 43p. incl. illus. tables, 7 refs.
(Contract AF 33(616)7909, Proj. 6373)
(AMRL TDR 62-135) Unclassified report

DESCRIPTORS: *Carbon dioxide, *Controlled atmospheres, *Air, *Strainers, *Biophysics, Silver compounds, Oxides, Regeneration, Adsorption, Absorption, Silicon compounds, Dioxides, Aluminum compounds, Mixtures, Carbonates, Gas flow, Theory, Design.

On the basis of a survey the two most potentially valuable regenerable CO2 sorption systems, molecular sieves and Ag2O preparations, were selected for laboratory investigation. The 5A molecular sieve removed CO2 from air containing 1 volume % CO2, provided that water vapor was first removed from the air. At a flow rate of 500 cc/min. of this air through a 1-inch diameter column containing 100 grams of 5A molecular sieve, the bed picked up about 3 grams of CO2 before CO2 was detectable in the column effluent. Under identical operating conditions, a 100-gram bed containing an Ag2O preparation picked up about 8 or 9 grams of CO2. Water vapor in the air is necessary for efficient utilization of the Ag2O. Both the 5A molecular sieve and the Ag2O preparation are rengenerable, but regeneration of the Ag2O occurs at a lower temperature. (Author)

AD-293 275 Div. 26, 22
(TISTM/EJH) OTS price $1.50

Watervliet Arsenal, N. Y.
ALUMINUM HARD COATING OF ORDNANCE MATERIEL.
Technical rept. for Aug 62,
by R. H. Hill and T. M. Pochily. Aug 62, 52p. incl. illus. tables (Rept. no. WVT-11-6203)
Unclassified report

DESCRIPTORS: *Ordnance, *Aluminum, *Aluminum coatings, Coatings, Anodes (Electrolytic cell), Electrochemistry, Manufacturing methods, Silicon alloys, Copper alloys, Bearings, Control systems, Industrial equipment, Hardness.

The acceptance of aluminum for use in ordnance materiel requires the application of a hard-protective coating. Several commercial systems were available for this purpose. The Alumilite 226 Process was selected for its comparative simplicity and efficiency. Some modification of the system and the use of an independent sensing control circuit produced exceptional results relative to growth rate, color continuity, and processing time. The increase in efficiency of the system was a direct result of the sensing circuit and a highly sensitive control design. Reduction in the processing time for the alloys used in the system were: 7075-T6, 38%; 2024-T4, 40%; and 6061-T6, 25%. The application of the coating to the copper-silicon bearing alloys was accomplished without fear of component dissolution. A technique, which included a slow break-in period with a progressive amperage approach, was developed to process the sensitive copper-silicon alloys. (Author)

AD-293 423 Div. 26, 15
(TISTP/JW) OTS price $7.60

RAND Corp., Santa Monica, Calif.
AN ANALYTICAL STUDY OF THE PERT ASSUMPTIONS,
by K. R. MacCrimmon and C. A. Ryavec. Dec 62, 69p. incl. illus. tables, 5 refs. (Memorandum no. RM-3408-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Research program administration, *Mathematical analysis, *Management engineering, Information theory, Data processing systems, Analysis, Errors.

This memorandum is part of a continuing research effort on network planning techniques for use in systems and project management. The PERT (Program Evaluation and Review Technique) system and its chief mathematical assumptions are analyzed. This memorandum presents the results of an attempt to evaluate the magnitude of the errors inherent in these assumptions. Work is continuing on other applications of network planning, extensions into resource (cost) management, and procedures for integrating their product with

current management information systems, for example, those described by Air Force Regulation 375 covering System Package Programming. The memorandum should be of use to various Air Force and other governmental organizations concerned with the application of PERT and related systems. (Author)

AD-293 424 Div. 26, 32
(TISTB/DGH) OTS price $11.00

RAND Corp., Santa Monica, Calif.
MILITARY PROCUREMENT AND CONTRACTING: AN ECONOMIC ANALYSIS,
by Frederick T. Moore. June 62, 136p. incl. illus. tables, 20 refs. (Memorandum no. RM-2948-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Military procurement, *Department of defense, *Government procurement, Costs, Distribution, Analysis, Economics, Procurement.

Problems of economic efficiency in military procurement and contracting are surveyed. It makes some specific suggestions for improvements; and, equally important, it discusses certain problems that require further study. The increasing percentage share of procurement represented by cost-plus-a-fixed-fee contracts is noted, and a reclassification of contract types to highlight the two ends of the spectrum--the incentive contract and the CPFF contract--is suggested. Samples of 290 incentive contracts and 2501 CPFF contracts are discussed and measures of profit and cost behavior are presented. From the samples it appears that there is a general tendency for costs to rise in CPFF contracts; in the incentive contracts there were cost underruns 70% of the time, but 50% of the time the underrun was less than 10% of the firm target cost. These measures of contract outcomes are the basis for the suggestions made for improvements in contracting. Improvements in contracting should help to raise the level of efficiency, but some institutional factors in the market are also basic to an improved solution. The impact of renegotiation on procurement is discussed. (Author)

AD-293 431 Div. 26
(TISTB/DGH) OTS price $10.50

RAND Corp., Santa Monica, Calif.
THE COSTS AND BENEFITS OF RESPONSIVE SUPPORT OPERATIONS,
by J. W. Petersen, H. W. Nelson, and R. M. Paulson. Oct 62, 123p. incl. illus. tables. (Memorandum no. RM-2871-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Costs, *Air force logistics, *Management engineering, *Air force operations, Scheduling, Simulation, Quality control, Operations research, Supply depots, Effectiveness, Logistics, Maintenance.

The impact of variations in support response on system performance and cost is investigated. The general results of the study indicate that there are large net benefits to be realized by more responsive support operations. The question of response was examined in the context of an integrated policy structure. While it is certainly possible to design a system in which the various functional areas react quickly, unless they react in a compatible manner one with another much of the potential response value will be lost. Compatible action across the functional areas requires an integrated set of support policies which ties all priorities to a common measure of relative item need. Simulated operations were conducted with such policies and the results of the study should be interpreted with this in mind. (Author)

AD-293 692 Div. 26, 15
(TISTP/WH) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
THEORETICAL EXPLANATION OF OBSERVED DECREASING FAILURE RATE,
by Frank Proschan. Nov 62, 11p. incl. illus. tables, 7 refs. (Mathematical note no. 281; Document no. D1-82-0215)
Unclassified report

DESCRIPTORS: *Aircraft equipment, *Reliability, *Probability, *Statistical analysis, *Statistical distributions, Life expectancy.

In this report, it is shown theoretically why a life distribution would under certain circumstances exhibit a decreasing failure rate. A new test is applied for monotonicity of failure rate to some observed life test data to verify that the life distribution does exhibit the decreasing failure rate expected under the circumstances. (Author)

27. PROPULSION SYSTEMS

AD-292 206 Div. 27, 25
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TEMPERATURE FIELD AND GRADIENTS IN ELEMENTS OF WELDED DISK TYPE TURBINE ROTOR UNDER STARTING CONDITIONS,
by V. I. Fedorov, M. O. Minyaylenko and S. S. Rusakov. 9 Nov 62, 8p. incl. illus. tables, 1 ref. (Trans. no. FTD-TT-62-1363 from Dopovidi, Akademiya Nauk Ukrayins'koyi RSR, no. 10, pp. 1317-1322, 1961)
Unclassified report

DESCRIPTORS: *Rotor blades, *Disks, *Turbines, *Welds, Welded joints, Heat transfer, Temperature, Conductivity, USSR, Starting, Thermodynamics.

Investigations of temperature distribution in a disk type welded rotor under starting conditions were carried out on hydrointegrators. The initial and boundary conditions of heat exchange, at which the investigations have been carried out, corresponded to turbine starting conditions. Characteristic in the construction of a disk type rotor is the sharp change in rotor profile at the zone where the disks are jointed with the cylinder, which ordinarily leads to irregularity in heating these elements. The temperature field was taken as the zone where the disk is jointed with the hollow cylinder, where considerable temperature gradients and stress concentrations do originate. (Author)

AD-292 210 Div. 27, 30
(TISTM/REB) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF THE TEMPERATURE FIELD AND

THERMAL STRESSES OF TURBINE DISCS,
by N. A. Minyaylenko. 1962, 89p. incl. illus. tables, 51 refs. (Trans. no. FTD-TT-62-766 from Izdatel'stvo Akademii Nauk Ukrainskoy SSR, Kiev, pp. 3-69, 1960)
Unclassified report

DESCRIPTORS: *Gas turbine disks, *Thermal stresses, Test methods, Temperature, Mathematical analysis, Determination.

A simplified method is given for calculating the temperature fields and the thermal stresses in radially cooled turbine discs. The method is based on results of investigations and studies conducted by the author in the Heat Engine Laboratory of the Institute of Heat and Power Engineering of the Academy of Sciences of the Ukrainian SSR and investigations of the temperature fields of rotors published in the Soviet Union and abroad. The material in the book is divided into three parts. The first part presented the simplified method and the sequence in the calculation of temperature fields and thermal stresses in turbine discs during the starting and the operational regimes of the turbine; it describes the use of the theory of a regular thermal regime to investigate heat-transfer processes when stopping and starting a hot turbine. In the second part the method and the results are given of an experimental determination of temperature fields during the starting regimes in rotating full-scale discs of gas turbines. In the third part the influence of various factors on the temperature field of the cooling turbine disc and the basis, in this regard, of certain assumptions used when developing the simplified method are presented. (Author)

AD-292 257 Div. 27
(TISTM/SJR) OTS price $1.75

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
DEVELOPMENT AND TESTING OF TUNGSTEN EMITTERS FOR ION PROPULSION SYSTEMS.
Final rept., 15 May 61-31 July 62 on Metallic Materials,
by J. M. Gerken, R. H. Hiltz, and F. J. Lally. Oct 62, 59p. incl. illus. tables, 3 refs. (Contract AF 33(616)8297, Proj. 7351) (ASD TDR 62-756) Unclassified report

DESCRIPTORS: *Electric propulsion, *Tungsten, *Manufacturing methods, Secondary emission, Porous metals, Electron beams, Welding, Niobium, Cesium, Metallurgy, Ion rockets, Thermionic emission.

A process is presented for the production of porous tungsten emitter discs with a pore spectrum of 0.7 to 0.9 microns and a mean pore diameter of 0.8 microns. Studies of joining the emitter discs to refractory metal plenum chamber by electron beam welding were conducted. Work was performed on both tungsten and columbium plenum chambers and in both cases embrittlement was a serious problem. Although difficulties were encountered in successfully welding round emitters into the plenum chamber, sufficient assemblies were prepared for testing. Assemblies successfully withstood 100 hour exposure at 2500 F in a cesium atmosphere. An initial ion efficiency of 98.4% was obtained but due to poisoning the ion efficiency decreased with increasing time at temperature. (Author)

AD-292 258 Div. 27, 17
(TISTM/SJR) OTS price $1.00

Defense Metals Information Center, Columbus, Ohio.
STEELS FOR LARGE SOLID-PROPELLANT ROCKET-MOTOR CASES,
by J. E. Campbell. 20 Nov 62, 32p. incl. tables, 35 refs. (DMIC rept. no. 178) (Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Rocket cases, *Steel, *Mechanical properties, Chromium alloys, Molybdenum alloys, Nickel alloys, Vanadium alloys, Cobalt alloys, Silicon alloys, Fracture, Manufacturing methods, Stainless steel, Alloys, Pressure vessels.

Over the past few years, several alloy steels that have been used for other applications requiring service at high strength levels have come into prominence for use in large solid-propellant rocket-motor cases. Treatments and properties of alloy steels that are being used or considered for rocket-motor cases are discussed in this report. (Author)

AD-292 770 Div. 27
(TISTA/FRL) OTS price $10.50

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
A SUMMARY OF RAMJET DESIGN CONSIDERATIONS,
by Ralph Zirkind. Apr 46, 122p. incl. illus. tables, 55 refs. (Rept. no. ADR-1003)
Unclassified report

DESCRIPTORS: *Ramjet engines, Diffusers, Subsonic flow, Supersonics, Combustion, Design, Ramjet engine nozzles, Tests, Theory, Compressors, Combustion chambers, Supersonic diffusers.

A study of ramjets and components is presented as follows: the operation of diffusers (subsonic and supersonic); the combustion process and its relationship to burner construction; the operation of the nozzle for subsonic and supersonic flight; and an analysis of the complete ramjet as a power plant. (Author)

AD-292 938 Div. 27, 26
(TISTM/REB) OTS price $1.60

Arde-Portland, Inc., Paramus, N. J.
FABRICATION OF PROTOTYPE ROCKET MOTOR CASE BY CRYOGENIC STRETCH-FORMING.
Quarterly rept. no. 2, 1 Sep-30 Nov 62,
by C. Parigian. 30 Nov 62, 11p. incl. illus. (Contract NOw 62-0370-c)
Unclassified report

DESCRIPTORS: *Rocket cases, Stainless steel, Metal forming presses, Cryogenics, Pressure vessels, Manufacturing methods.

Various Sparrow vessel configurations were fabricated and stretched. Two composite belly band vessels were completed. The composite consists of a stretched belly band vessel, to one end of which is welded a mechanically stretched nozzle housing. On one of these vessels, simulated antenna clips were resistance-welded to the cylinder walls. Both vessels were then stretched cryogenically to a pressure of 3000 psi to strengthen the newly welded regions. The vessel to which the nozzle housing and antenna clips were welded was subjected to hydrotest to yield after restretching. The vessel first yielded in the region of the hemispherical head to nozzle housing juncture at a pressure of 2700 psig. This was equivalent to a nominal stress on the thin-walled cylinder of 194,000 psi, which meets the strength level requirement of the motor case

design. Two 80% boss belly band vessels were fabricated and cryogenically stretched. These two 80% boss vessels were inspected after stretch, and both vessels were dimensionally acceptable. (Author)

AD-293 287 Div. 27
(TISTA/FRL) OTS price $1.60

Marquardt Corp., Van Nuys, Calif.
(No title)
Letter progress rept., 3-31 Dec 62,
by W. A. Whitney. 31 Dec 62, 16p. incl. illus. tables (Rept. no. PR 273-13, pt. 1)
(Contract AF 33(657)7770)
Unclassified report

DESCRIPTORS: *Ramjet engines, Thrust, Fuel consumption, Tests, Fluid flow, Valves, Solenoids, Fluids, Military requirements, Acceptability.

A summary of RJ43-MA-11 fullscale engine acceptance testing of ramjet engines is presented. Included are discussions of engine thrust and specific fuel consumption performance, acceptance test discrepancies, and test fluid correlation. The minimum performance requirements were exceeded by all delivered engines. (Author)

AD-293 422 Div. 27, 14, 4
(TISTM/EJH) OTS price $9.60

Hughes Aircraft Co., Culver City, Calif.
ROCKET LINER PROGRAM.
Final technical rept., 1 July 60-1 Oct 62,
by S. B. Eglin and A. L. Landis. 1 Oct 62, 114p. incl. tables, 27 refs.
(Contract DA 04-495-ORD-3079)
Unclassified report

DESCRIPTORS: *Rocket cases, *Combustion chamber liners, *Thermal insulation, *Elastomers, Insulating materials, Heat resistant polymers, Metalorganic compounds, Tin compounds, Metalorganic plastics, Polymers, Silicones, Silanes, Nitrogen compounds, Titanium compounds, Aluminum compounds, Arsenic compounds, Piperidines, Heterocyclic compounds, Synthesis, Copolymerization, Aging, Ablation, Pyrolysis, Lead compounds.

Technology was developed for the preparation of metallosiloxane elastomers. In the case of the random stannosiloxane copolymers, elastomers having mechanical properties comparable to those of commercial silicone rubbers were prepared. The newly developed technology consists of a procedure for preparing, by interfacial cohydrolysis, essentially linear silanol-terminated stannosiloxane copolymers, containing about equal amounts of tin and silicon, a procedure for chain-extending of these copolymers to yield tough elastomeric gums and a procedure for curing of stannosiloxane gums by the addition of a silicon hydride with a trace of organic peroxide as catalyst. Torch test evaluations of metallosiloxane polymer-based insulation compositions showed that none of the latter compositions compared favorably with commercial nitrile rubber (NBR)-phenolic resin compositions as ablative insulation materials on the basis of either insulation indices or erosion rates.

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-291 951 Div. 28
(TISTB/DGH) OTS price $.75

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
ATTENTION LEVEL AND VISUAL AND AUDITORY MONITORING PERFORMANCE.
Report on Design Criteria for Ease of Maintenance,
by Louis T. Pope. Aug 62, 20p. incl. illus. tables, 12 refs.
(Proj. 7184)
(AMRL-TDR-62-97) Unclassified report

DESCRIPTORS: *Attention, *Tracking, Effectiveness, Tests, Human engineering.

The relationship between performance on a monitoring (vigilance) task and level of alertness as measured by performance on a tracking tank was investigated. Each of 20 male college subjects was tested under each of ten experimental conditions. The experimental conditions consisted of various combinations of: auditory or visual monitoring; low or high rate of signal input; auditory or visual tracking; and simple or complex tracking problems. The results indicate that for the visual vigilance conditions more signals were missed when the subject was simultaneously engaged in a tracking task; however, this was not true for the auditory vigilance conditions. On both the visual and auditory vigilance tasks the decrement in performance during the 45 minute test period was less when a tracking task was performed simultaneously. Furthermore, the better the subject tracked, or the more frequent the vigilance signals, the greater the likelihood of a signal being detected. (Author)

AD-292 105 Div. 28
(TISTB/DGH) OTS price $5.60

Hawaii U., Honolulu.
POWER, STRATEGY, AND THE FORMATION OF COALITIONS IN TRIADS UNDER FOUR INCENTIVE CONDITIONS,
by W. Edgar Vinacke. 12 Oct 62, 48p. incl. tables, 12 refs. (Technical rept. no. 1)
(Contract Nonr-374802, Proj. NR 170-270)
Unclassified report

DESCRIPTORS: *Group dynamics, *Behavior, Effectiveness, Achievement tests, Reasoning, Reaction (Psychology), Adjustment (Psychology), Measurement, Sociometrics.

A simple competitive board game was used to determine the characteristics of strategy manifested by three-person groups. Intra-member relationships in relative power were varied by the drawing of weights to establish conditions in which the three players were all-equal, one or two members were stronger but when any two exceeded the third in strength, and one member was all-powerful. Six of these patterns were adopted, in three successive series, making 18 games for each group. Data were collected from 30 groups of each sex, playing under one of four incentives, namely, game-by-game scoring, cumulative scoring, delayed payoff monetary reward, and immediate payoff monetary reward. Inter-sex and inter-incentive comparisons were made in terms of kind and incidence of coalitions, deals reached, amount and character of bargaining, and a number of manifestations of strategy. Results indicate that the general style of play is similar under all incentives, with certain specific variations produced by the special

problems posed by the incentive condition. The most striking behavior is associated with differences between exploitative (masculine) and accommodative (feminine) strategy. (Author)

AD-292 120 Div. 28
(TISTB/MS) OTS price $10.10

Fordham U., New York.
PERCEPTION OF DISTORTION. I. AN EXPERIMENTAL APPROACH TO ILLUSION,
by Richard T. Zegers and Patricia A. Murray.
Oct 62, 128p. incl. illus. tables, refs.
(Contract N61339-506)
(NAVTRADEVCEN 506-1) Unclassified report

DESCRIPTORS: *Perception, *Optical illusions, *Visual perception, Motion, Rotation, Vision, Distortion.

The research aimed at the selection and quantification of parameters which contributed to the reversal illusion perceived with rotating trapezoid. The parameters studied were binocular versus monocular viewing, speed of rotation, relative height of vertical sides, viewing distance, size, tilt of axis of rotation, patterning, subject appraisal of target position, and age. The results yielded data confirming wide variability among subjects. Within limits size and viewing distance were equivalent. Relative length of vertical edges yielded results of only minor value. Angle of tilt was effective. Certain types of patterning reduced the illusory effect. Extreme rotational speeds yielded differences. Children as young as four years of age perceived the illusion as well as adults. The general conclusion is that the conditions for perceiving the illusion are due to the failure of one or more sensory cues whose value to the individual depends upon his perceptual structure. (Author)

AD-292 144 Div. 28
(TISTB/MS) OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
EFFECT OF VARIATION OF THE DRIFT PARAMETER ON CONTROL OF A STOCHASTIC PROCESS.
Rept. for Aug-Oct 61 on Psychological Research on Human Performance,
by William H. Pearson. Aug 62, 16p. incl. illus. tables, 3 refs.
(Proj. 7183)
(MRL TDR 62-72) Unclassified report

DESCRIPTORS: *Human engineering, *Difference equations, *Control simulators, Probability, Computers, Control systems.

This research examines man's ability to control a simple process whose systematic drift is obscured by random variations. Of the many combinations of systematic drift and random variation possible in such a process, four were investigated experimentally. Under two of these conditions the process would, if uncorrected, tend to diverge from the control limits. Under the other two conditions the process would tend to remain within or return to the control limits. For the two explosive conditions an appropriate control strategy would be to correct the process before it exceeded the control limits. For the two self-controlled conditions an appropriate strategy would be to correct infrequently. Subjects corrected before control limits were exceeded more frequently under the explosive conditions than under the self-controlled conditions. However, under the self-controlled conditions the subjects corrected more frequently than necessary. This suggests that when operating a self-controlled process humans do not behave optimally. (Author)

AD-292 153 Div. 28
(TISTB/DGH) OTS price $5.60

Massachusetts U., Amherst.
PAIRED-ASSOCIATES LEARNING UNDER VARIATIONS IN OCCURRENCES OF RESPONSE MEMBERS.
Final scientific rept.,
by Albert E. Goss. 30 Nov 62, 43p. incl. tables, refs.
(Contract Nonr-269100)
Unclassified report

DESCRIPTORS: *Learning, *Verbal behavior, *Reaction (Psychology), Memory, Test methods, Experimental data, Statistical analysis.

Contents:
Acquisition and post-acquisition performance as functions of %ORM and stimulus characteristics
Memory drum, Ss alone, anticipation
Booklets, Ss in groups, recall
Acquisition as functions of stimulus characteristics
Anticipation and recall techniques of presentation
Mixed lists
Unmixed lists
Acquisition and post-acquisition performance with divergent PA units
Acquisition, Ss alone
Acquisition and post-acquisition performance, Ss alone
Acquisition and post-acquisition performance, Ss in groups
Exploratory experiments
Post-criterion strengthening of stimulus-response relationships under 0% ORM
Partial replication of Musgrave's experiment

AD-292 331 Div. 28
(TISTB/DGH) OTS price $4.60

Air Force Hospital, Andrews Air Force Base, Washington, D. C.
STUDIES OF ADULT PERSONALITY DEVELOPMENT. A REVIEW OF RESEARCH UP TO 1954,
by Sheldon L. Freud. 1962, 45p. 42 refs.
Unclassified report

DESCRIPTORS: *Personality, *Age, Man, Women, Design, Growth, Scientific reports, Abstracting, Measurement, Personality tests, Intelligence tests, Sex, Bibliography.

Intellectual activity as a whole seems to decline with increasing age, beginning around the end of adolescence and proceeding gradually until around 60 when rate of decline increases. Individuals of higher intelligence show less decline with age both in general intelligence and in specific factors involved in intelligence. Decline of specific abilities which enter into general intelligence is not uniform with age. Performance on intelligence tests may be related to such factors as practice of skills, motivation, and persistence. Most change of interests occurs in early maturity. Interests involving physical and group activities and amusements tend to decline with age and liked and disliked interests tend to become more pronounced. Personality tests point to increased tension, rigidity, and a decline in happiness and in masculinity with increasing age. Rorschach data indicates a general constriction in intellectual and emotional spheres, a decline in social adaptability and in responsiveness to the environment. There are specific indications of lowered drive, narrowing of interests, diminishing creativeness, reduced control, insecurity, and shallow emotional experience with progressing age. (Author)

Division 28 - PSYCHOLOGY AND HUMAN ENGINEERING

AD-292 339 Div. 28
(TISTB/LMH) OTS price $6.60

Kansas State U., Manhattan.
THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE.
Nov 62, 66p. incl. illus. table, refs. (Technical rept. nos. 5-8, 1962)
(Contract Nonr-363401)
Unclassified report

DESCRIPTORS: *Visual perception, *Psychology, Psychoacoustics, Visual acuity, Visual thresholds, Tachistoscopes, Noise, Determination, Light adaptation, Analysis of variance, Electroshock, Perception.

This report includes:
PATTERNS OF EXPERIENCE AND THE PERCEIVED ORIENTATION OF THE NECKER CUBE, by Edward D. Turner and William Bevan. Nov 62, (Technical rept. no. 5, 1962)

THE EFFECT OF SUBLIMINAL TONES UPON THE JUDGMENT OF LOUDNESS, by William Bevan and Joan Faye Pritchard. Nov 62 (Technical rept. no. 6, 1962)

ON THE APPROACH OF THE EXPERIMENTAL PSYCHOLOGIST, by William Bevan. Nov 62 (Technical rept. no. 7, 1962)

STUDIES OF ANOMALOUS CONTRAST AND ASSIMILATION, by Harry Helson. Nov 62 (Technical rept. no. 8, 1962)

Three experiments dealt with perceived orientation of the Necker Cube as a function of patterns of stimulus input prior to presentation of the balanced or ambiguous cube. A pilot study and three experiments were conducted to determine if a subliminal anchor-effect could be demonstrated for the dimension of loudness. (Author)

AD-292 710 Div. 28
(TISTB/DGH) OTS price $3.60

Washington U., Seattle.
EFFECTS OF IPRONIAZID ON AVOIDANCE BEHAVIOR IN THE SLEEP-DEPRIVED RAT.
Semiannual rept. no. 4, part 1, 1 June-30 Nov 62, by William J. Devery and Audrey R. Holliday. 30 Nov 62, 33p. incl. illus. tables, 18 refs.
(Contract DA 18-108-cml-6364)
Unclassified report

DESCRIPTORS: *Drugs, *Behavior, *Conditioned reflex, *Sleep, Stimulation, Nervous system, Laboratory animals, Rats, Effectiveness, Laboratory equipment, Test methods, Experimental data, Tables, Reaction (Psychology), Learning, Inhibition.

Thirteen pairs of rats were run continuously for 5 days in an escape-avoidance situation utilizing a shuttle box. One rat of each pair was treated with iproniazid; the other with saline. The iproniazid group showed a significantly greater number of avoidances per hour during the last 1/2 of the 1st and 2nd days, all of the 3rd day, and the first 1/2 of the 4th day. Several rats were run in the same apparatus 16 hours/day for 4 weeks with administration of iproniazid after a stable level of avoidances/day had been reached. Some showed an increased rate of avoidance responding with a peak 6 - 11 days after the 1st injection while others showed no effects. (Author)

AD-292 795 Div. 28
(TISTB/MS) OTS price $12.00

Saarlands U. (Germany).
EFFECTS OF ANXIETY LEVEL AND MILD SITUATIONAL STRESS ON VARIOUS PSYCHOLOGICAL FUNCTIONS. THE INTERRELATIONSHIPS AMONG THESE FUNCTIONS, ANXIETY LEVEL AND OTHER PERSONALITY VARIABLES. A MULTIVARIABLE AND FACTORIAL STUDY.
Final technical rept.,
by Otfried Spreen. Aug 62, 1v. incl. illus. tables, refs.
(Contract AF 61(052)483)
Unclassified report

DESCRIPTORS: *Anxiety, *Factor analysis, Stress (Psychology), Stress (Physiology), Behavior, Tests.

Fifty-eight variables selected from various psychological functions were studied. These included physiological, psychophysiological, simple motor and perceptual and complex behavioral functions as well as intelligence and personality tests. Two-hundred ninety-two young, healthy German males participated in the tests. They were selected as representing the highest and lowest 30% on an anxiety scale, matched for intelligence. High and low anxiety groups were randomly assigned to conditions of mild situational stress and non-stress. For each variable an individual statistical analysis was performed. Later 40 variables were selected for factor analysis. Results were as follows: (a) None of the variables under investigation was significantly influenced by stress and non-stress conditions of testing. (b) Fifteen out of 36 hypotheses concerning anxiety level were confirmed. (c) Sixteen significant factors were extracted 4 of which were interpreted as specific and 7 as ''ability'' factors. The remaining factors were interpreted as (1) psychopathic unresponsiveness, (2) maladjustment as expressed on questionnaires, (3) mania-depression, (4) hysteria, and (5) elated superficiality. (Author)

AD-293 170 Div. 28
(TISTB/DGH) OTS price $1.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
HUMAN REACTIONS TO AIR IONS. PART III: THE EFFECT OF ATMOSPHERIC IONS ON HUMAN PERFORMANCE - A FURTHER EXPERIMENT,
by Richard E. Granda and Blair Savage. Oct 62, 16p. incl. illus. table, 4 refs.
(Contract Nonr-330300)
Unclassified report

DESCRIPTORS: *Psychometrics, *Behavior, *Ions, Atmosphere, Air, Stimulation, Reactions (Psychology), Analysis, Man, Experimental data, Perception, Tracking, Ionization, Psychomotor tests.

The second of two experiments was conducted to investigate effects of air ions on human performance. Twenty-four subjects worked on two psychomotor tasks under experimental stress while exposed to positive ions, negative ions, and no ions (control case). No significant differences between treatments were found. Evidence from both ion experiments strongly supports the conclusion that ions (at least up to concentrations of about 60,000 ions per cc) have no apparent effect on psychomotor performance in either stress or nonstress situations. (Author)

AD-293 191 Div. 28
(TISTB/MD) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
SOME FACTORS IN THE EMOTIONAL ADJUSTMENT OF RADAR OBSERVERS IN JET FIGHTER INTERCEPTOR

AIRCRAFT,
by Joseph J. Reidy and Horace F. Drury.
Nov 53, 7p. (Technical rept. no. 56; Special rept. no. 1)
(Proj. 22-1201-0000)
Unclassified report

DESCRIPTORS: *Adjustment (Psychology), Blood chemistry, Steroids, Urine, Stress (Physiology), Stress (Psychology), Arctic regions, Anxiety, Emotions, Radar operators.

AD-293 222 Div. 28, 23, 16
(TISTB/MS) OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
AN ANALYSIS OF THE BEHAVIOR OF LONG TETHERLINES IN SPACE.
Final rept. for Apr-July 62 on Human Performance in Advanced Systems,
by Donald D. Mueller. Nov 62, 13p. incl. illus. 4 refs.
(Proj. 7184)
(AMRL TDR 62-123) Unclassified report

DESCRIPTORS: *Space flight, *Maintenance personnel, *Cable assemblies, Spaceships, Weightlessness, Motion, Moments, Mathematical analysis, Velocity, Test methods, Stress (Physiology).

To determine the feasibility of using long tetherlines to aid in orbital docking or to recover astronauts operating outside a vehicle an analysis was made of the behavior of an inert mass on the end of a tetherline as it is reeled in toward a more massive vehicle. Only coplanar motions were considered. Three methods of reeling the mass in toward the vehicle were analyzed: impulsive jerks on a slack tetherline, constant line tension, and constant reel-in speed. The first two methods result in complex paths which intersect the vehicle only after long periods of time. The third method results in a spiral path in which both the velocity and centripetal acceleration of the mass approach infinity as the line length approaches zero. Since angular momentum of the mass around the vehicle is very nearly conserved, the magnitude of the retrieval problem depends primarily on the initial length of the tetherline and the initial tangential velocity of the mass. Reeling in a line a few hundred feet in length can result in forces which would be intolerable to an astronaut. (Author)

AD-293 247 Div. 28, 32
(TISTB/DGH) OTS price $1.60

California U., Los Angeles.
DYNAMICS OF SOCIAL INFLUENCE.
Annual rept. no. 4, Dec 61-Dec 62,
by Bertram H. Raven and David O. Sears. Dec 62, 10p. 5 refs.
(Contract Nonr-23354, Proj. NR 171-350)
Unclassified report

DESCRIPTORS: *Sociology, *Sociometrics, *Leadership, *Decision making, Attitudes, Public opinion, Effectiveness, Measurement, Pyschomotor tests, Determination, Propaganda, Scientific reports, Group dynamics, Behavior.

Contents:
Bibliography of small group literature
Social influence on beliefs, behavior, and judgment
Measuring of beliefs and attitudes
Social influence in interdependent situations
Self-evaluation in examinations
Antecedents of a leader's influence potential
Voluntary exposure to propaganda
Effects of set and information on opinions
Effects of professional reference group on judgment

AD-293 264 Div. 28
(TISTB/DGH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
A MEASURE FOR CRACKPOTS,
by Fred J. Gruenberger. Dec 62, 13p. incl. table (Rept. no. P-2678)
Unclassified report

DESCRIPTORS: *Scientific personnel, Attitudes, Measurement, Determination, Personality, Effectiveness.

There is no acid test or even a small group of tests which will serve to distinguish infallibly between crackpot work and good science. For every criterion that is advanced one can quickly think of a counter example. Every idea that is offered falls somewhere between the two extremes. Since there is no single test, a check list of some of the attributes of science and of the crackpot is offered to help in making this decision. Each possible test, it would seem, can fail to discriminate by itself. It is the aggregate of many of them that will be used to make up a discriminator. It seems fruitful (and fruitfulness is one of the attributes of science) to try to list some of the attributes of scientific endeavor (and/or crackpotism) and try to use the list as a measuring device. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-292 644 Div. 29
(TISTB/LMH) OTS price $3.60

Pillsbury Co., Minneapolis, Minn.
DEVELOPMENT OF BITE SIZE FOOD PIECES.
Final rept. no. 2, 8 Dec 61-7 July 62,
by H. E. Bauman. 7 July 62, 33p. incl. illus.
(Contract DA 19-129-qm-1937)
Unclassified report

DESCRIPTORS: *Food, *Packaging, Containers, Coatings, Preservation, Acceptability, Storage, Climatic factors, Encapsulation, Plasticizers, Processing, Feeding.

AD-292 903 Div. 29
(TISTB/DGH) OTS price $1.25

Quartermaster Research and Engineering Center, Natick, Mass.
A SURVEY OF 18-OUNCE BLENDED SERGE FABRICS: WEAR RESISTANCE,
by Louis I. Weiner. Nov 62, 36p. incl. illus. tables, 20 refs. (Textile Series rept. no. 123)
Unclassified report

DESCRIPTORS: *Textiles, Woolen textiles, Synthetic fibers, Rayon fibers, Nylon, Abrasion, Theory, Tables, Experimental data, Effectiveness, Measurement, Stresses, Mechanical properties, Test methods.

The wear resistance of 13 experimental blended serge fabrics was evaluated on the Wool Fabric Course of the Quartermaster Field Evaluation

Agency at Fort Lee, Virginia, and, by means of the Stoll Flex Abrader and a new Sand Abrader, at the Quartermaster Research and Engineering Laboratory in Natick, Massachusetts. The evaluation indicates that wear resistance is influenced by blend composition and the energy-absorbing ability of the component fibers. The results of the sand abrasion tests were found to be similar to those produced on the wool course and suggest that the sand abrader may be useful in indicating wool course results. The theory behind some of the mechanisms that may influence the wear of textile fabrics is included in order to point out additional approaches to the problem of wear. (Author)

AD-292 974 Div. 29
(TISTB/MD) OTS price $1.60

Thompson Optical Engineering Co., Los Angeles, Calif.
IMPROVEMENTS IN GRADED, NEUTRAL-DENSITY FILMS FOR ATTENUATION OF VISIBLE LIGHT BY OPHTHALMIC LENSES,
by Robert E. Frazer. Nov 62, 17p. incl. illus.
(Contract AF 33(600)41498)
(AMRL memo. V-20)
Unclassified report

DESCRIPTORS: *Goggles, *Optical filters, Titanium, Evaporation, Silicon compounds, Monoxides, Vacuum systems, Density, Coatings, Optical coatings, Lenses, Manufacturing methods, Preparation.

In an effort to derive greater protection to the visual mechanism under adverse conditions, a series of metals were evaluated as optical neutrals in the visible and near IR and UV. The most promising of these was titanium deposited as a neutral wedge on the concave surfaces of uncorrected ophthalmic lenses. Operational problems and the effect of graded-density variables encountered in depositing two-layer systems are discussed and some solutions are offered. (Author)

AD-293 131 Div. 29, 16
(TISTB/LMH) OTS price $5.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EMERGENCY FOOD VALUE OF ALASKAN WILD PLANTS,
by Horace F. Drury and Stanley G. Smith.
July 57, 47p. incl. illus. 7 refs. (Rept. no. AAL TN 57-16)
(Proj. no. 7952)
Unclassified report

DESCRIPTORS: *Food, *Plants, Vegetables, Fruits, Nutrition, Poisons, Trees, Lichens, Arctic regions, Alaska.

Contents:
Important species
Nutritional values
Availability
Collection and preparation
Poisonous plants
Suggestions to instructors

AD-293 159 Div. 29
(TISTB/LMH) OTS price $1.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
ADAPTABILITY OF SHEAR PRESSES TO SPECIFYING TENDERNESS OF COOKED, SLICED, FREEZE-DRIED BEEF. Interim rept.,
by J. M. Tuomy and R. G. Young. Dec 62, 17p. incl. illus. tables (AMXFC rept. no. 39-62)
Unclassified report

DESCRIPTORS: *Food, Beef, Processing, Acceptability, Nutrition, Preparation, Freeze drying.

A series of runs was made in which the tenderness and cuttability of cooked sliced beef as rated by a trained technological panel were compared to the ratings obtained with both the Warner-Bratzler and the Kramer shear presses. The correlations found between the various ratings were good and it is believed that the shear press readings can be developed into requirements for freeze-dried meats which would increase assurance of procuring satisfactory end products. Differences of product slice thickness from one-eighth to one-fourth inch were found not to make an appreciable difference in the final ratings by either the panel or the presses provided that the slices could be combined to give the same height stack for the shear press. (Author)

AD-293 171 Div. 29
(TISTB/CCH) OTS price $2.60

Arctic Aeromedical Lab., Ladd Air Force Base, Alaska.
REPORT ON ARCTIC SURVIVAL KIT, PASSENGER.
1962, 24p. incl. illus. (Technical rept. no. 57-3, rev. no. 1)
Unclassified report

DESCRIPTORS: *Survival kits, Arctic regions, Bailout, Aircraft equipment, Survival, Aviation personnel.

A survival kit for passengers, which can be quickly attached to a standard back-type parachute, was developed and some of the essential items of equipment needed to survive in the arctic following an emergency bailout were provided. The individual passenger survival kit is entirely satisfactory for emergency bailout. The durability of the kit construction is adequate for the intended use. Each passenger is afforded a greater chance for survival in the arctic by wearing the proposed kit and sleeping bag than is provided by one large cargo aircraft survival kit. Pilots will have more of an opportunity in deciding whether to crash land or to bailout the passengers when individual passenger survival kits are provided. Economy of weight and equipment is realized by the provisioning of survival gear based upon the number of passengers actually carried aboard the aircraft. (Author)

AD-293 274 Div. 29
(TISTB/CCH) OTS price $4.60

NRC Equipment Corp., Newton, Mass.
IMPROVING FREEZE-DRYING PROCESS EFFICIENCY THROUGH IMPROVED VAPOR REMOVAL AND IN-PROCESS MOISTURE DETERMINATION.
Rept. no. 8 (Final), 15 Jan 60-30 June 62,
by B. Kan. 30 June 62, 22p. incl. illus. tables.
(Contract DA 19-129-qm-1546)
Unclassified report

DESCRIPTORS: *Freeze drying, Moisture, Absorption, Temperature, Atmosphere, Food, Beef, Effectiveness.

Following the course of freeze drying processes and controlling their progress have been examined. The methods utilizing measurements of chamber atmosphere, surface temperature measurement and moisture analysis by measurement of RF power absorption appear most promising and all merit further examination for application on full scale drying units. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-292 067 Div. 30, 20
(TISTP/JW) OTS price $4.00

Internuclear Co., Inc., Clayton, Mo.
ISOLATE - A DIGITAL COMPUTER SOLUTION TO PLANE PARALLEL RADIATIVE TRANSFER.
Final rept. for Dec 60-Jan 62 on Nuclear Weapon Effects on Aerodynamic Vehicles,
by Glen E. Putnam, Yong S. Kim, and Robert J. Neuhold. Oct 62, 268p. incl. illus. tables.
(Contract AF 33(616)7742, Proj. 1350)
(ASD TDR 62-544) Unclassified report

DESCRIPTORS: *Difference equations, *Digital computers, Programming, Transport properties, Special functions, Matrix algebra, Radiation effects, Geometry, Diffusion, Boundary layer.

The digital computer program, ISOLATE, is designed to solve the Boltzmann transport equation for problems with the following properties: monodirectional sources incident at any angle to a boundary; plane parallel geometry; anisotropic scattering in a series of contiguous media; monoenergetic radiation or particle consideration; anisotropic diffuse sources at the slab boundaries; and isotropic or symmetrical reflection at the slab boundaries. Problems are solved by expressing the Boltzmann transport equation and the flexible boundary condition equations in difference equation form on the phase space. The difference equations are solved by a direct method, which takes advantage of special properties of the matrices. It is a novel approach to solutions of such problems; and it has proved to be a much faster and more efficient method than the usual iterative methods in many practical instances. The formulation and the solutions of the difference equations are described and detailed instructions are included to facilitate both the application of the code to physical problems and the actual operation of the code. The code is written in the language of FORTRAN II. Problem running times with the direct method of solution rarely exceed fifteen minutes on the IBM 7090. (Author)

AD-292 086 Div. 30
(TISTA/FRL) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
INVESTIGATION OF THE CONTAMINATION OF REFLECTOR SURFACES OF INFRARED RADIATORS TO BE USED IN SPACE SIMULATORS,
by Fred G. Sherrell. Dec 62, 25p. incl. illus. 5 refs. (Rept. no. AEDC TDR 62-233)
(Contract AF 40(600)1000)
Unclassified report

DESCRIPTORS: *Infrared equipment, Reflectors, Vacuum systems, Films, Gases, Analysis, Quality control, Rotary pumps, Tungsten wire, Simulation, Infrared radiation, Diffusion pumps, Space environmental conditions, Contamination.

An investigation was made of a reflector of a bare-tungsten-sourced infrared radiator in high vacuum. The reflector became overcoated with a multicolored film which seriously deteriorated the efficiency of the radiator. A series of experiments of a qualitative nature was performed to determine which gases commonly found in oil-diffusion-pumped high vacuum systems were involved in the production of the contaminating film. Evidence concerning the chemical nature of the film was obtained by having a sample analyzed by electron diffraction techniques, and certain recommendations are made to help ensure the successful operation of bare-tungsten-sourced infrared radiators in high altitude test chambers. (Author)

AD-292 109 Div. 30
(TISTB/DGH) OTS price $6.60

RAND Corp., Santa Monica, Calif.
SOME PROBLEMS OF BASIC ORGANIZATION IN PROBLEM-SOLVING PROGRAMS,
by Allen Newell. Dec 62, 61p. incl. illus. 25 refs. (Research memo. no. RM-3283-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Computers, *Programming, *Decision making, *Information retrieval, Analysis, Processing, Data.

Several examples of organizational problems dealing with the construction and application of problem-solving programs are examined. The first example is how to store information that is created dynamically and unpredictably during the operation of the program. The second example is how to organize large, complex processes. The third example is how to have many different kinds of goals producing many different kinds of results, and yet be able to use these results in the rest of the problem. The fourth example is how to avoid the rigidities of many special routines when building up highly particular and inhomogeneous collections of data. The last example concerns the general problem of how to remember the past. All of these problems stem from the fact that problem-solving programs are more dynamic and require more flexibility than we know how to provide. By solving these organizational problems in this context we can expect to develop the appropriate ways to organize complex programs that require flexibility in many applied areas as well. (Author)

AD-292 136 Div. 30
(TISTB/MS) OTS price $5.60

Texas U., Austin.
(No title).
Quarterly progress rept. no. 13, 1 May-31 July 62,
by W. P. Lehmann and E. D. Pendergraft. Aug 62, 47p. incl. illus. 10 refs. (Rept. no. LRC 62-P13)
(Contract Grant NSF G-19277)
Unclassified report

DESCRIPTORS: *Machine translation, *Documentation, Language, Automation, Analysis, Theory, Probability, Coding, Classification, Computers.

This report describes progress toward implementation of a computer system to support mechanical translation, and other linguistic processes which are potentially applicable to scientific documentation. These include inferential and self-organizing processes which may be relevant to automatic abstracting and information retrieval. Those components of the system which are necessary to automatic syntactic analysis are approaching completion. A brief summary of the system design to date is included. (Author)

AD-292 155 Div. 30, 2, 14
(TISTM/EJH) OTS price $5.60

Columbia U., New York.
FLUORESCENT COATINGS ON COARSE SEDIMENTS: AN

INTEGRATED SYSTEM,
by Warren E. Yasso. 1962, 48p. incl. illus. tables, 4 refs. (Technical rept. no. 1)
(Contract Nonr-26668, Proj. NR 388-057)
Unclassified report

DESCRIPTORS: *Luminous pigments, *Fluorescent dyes, *Coatings, *Sedimentation, Dyes, Sand, Ultraviolet radiation, Beaches, Climatic factors, Transportation, River currents, Test methods, Materials, Photometers, Geology.

A wide assortment of daylight and near-UV fluorescent dyes was used in coating formulations which should allow rapid qualitative or quantitative estimate of sediment transport in rivers or on beaches. There is sufficient range in physical properties of the coatings to meet the needs of most studies. Field sediment sampling can be eliminated or supplemented by photometric measurement of marked particle concentration. Field trials were an attempt to test the system's usefulness as an adjunct to beach morphology investigations in progress at Sandy Hook, New Jersey. Difficulty arose, not with the fluorescent sand system, but rather with inadequate, nonphotometric sampling techniques currently in use. Many aspects of beach morphology investigation, such as depth of sand disturbance, sorting, stratification, and particle dispersion, proved amenable to study using coated particles. (Author)

AD-292 168 Div. 30
(TISTE/PAR) OTS price $3.60

RAND Corp., Santa Monica, Calif.
ANATOMY OF AN ASSEMBLY SYSTEM,
by George Mealy. Dec 62, 30p. incl. tables.
(Rept. no. P-2674)
Unclassified report

Presented at the University of Michigan Engineering Summer Conferences, June 18-29, 1962, held in Ann Arbor, Michigan.

DESCRIPTORS: *Programming, *Computers, Machine translation, Data processing systems, Classification, Instruction manuals, Analog computers, Digital computers.

The Generalized Assembly System (GAS) combines a number of features which have either been talked about in the past or have actually appeared in one form or another in working assemblers. The motivation for designing GAS is threefold. First, combining these features in one system, while desirable in itself, will provide a far more powerful assembly mechanism than any which is currently available. Second, mechanisms within GAS already provide a large part of what is needed to construct translators; one should capitalize on this fact by designing translators as the top level of the assembly system rather than as self-contained entities or preprocessors. Third, GAS is intended to be as much a research tool as it may be a practical assembly system for everyday use. A general description is presented of both the GAS language and the organization of the GAS processor. (Author)

AD-292 172 Div. 30
(TISTP/JW) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE FX-1 MAGNETIC FILM MEMORY,
by J. I. Raffel, A. H. Anderson and others.
27 Aug 62, 30p. incl. illus. tables, 5 refs.
(Technical rept. no. 278)
(Contract AF 19(628)500)
(AFESD TDR 62-250) Unclassified report

DESCRIPTORS: *Magnetic recording systems, Reliability, Computers, Maintenance, Digital systems, Thin films, Memory.

This report discusses a magnetic film memory of 256 words and 13 digits, whose read-write cycle time is 370 nsec, access time is 200 nsec, and time for writing only is 115 nsec. The 13x60-mil evaporated permalloy elements are 1000A thick. A common bridge digit line is used for driving and sensing, and its word lines are excited directly by a transistor-driven diode matrix. The most serious problem encountered was an adjacent-word disturb condition due to fringing fields from the densely packed word lines. However, this magnetic film memory has been operating in the FX-1 computer for a number of months with good reliability and negligible maintenance. (Author)

AD-292 204 Div. 30
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD OF CONSTRUCTING A LINEAR FERRITE MEMORY DEVICE AND A DEVICE FOR IMPLEMENTING THE METHOD,
by Yu. A. Popov. 20 Nov 62, 4p. incl. illus.
(Trans. no. FTD-TT-62-1362 from Soviet Patent no. 140267 (682945/26), 22 Oct 62)
Unclassified report

DESCRIPTORS: *Memory devices, *Storage tubes, *Ferrites, Amplifiers, Coding, USSR.

A method of constructing a linear ferrite memory device is presented. The number being stored, which is expressed in a binary code, is converted into a quaternary code used for storage, and is converted back into the binary code during readout. A device for implementing the method to reduce the number of elements, a single core is used for each value of quaternary information (two digits of a binary number). (Author)

AD-292 221 Div. 30, 26
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMPUTERS AND AUTOMATION OF PRODUCTION CONTROL,
by V. M. Glushkov. 14 Nov 62, 9p. incl. illus.
(Trans. no. FTD-TT-62-1405 from Vestnik Akademii Nauk SSSR (Otdel'nyy Ottisk), no. 4, pp. 86-90, 1962)
Unclassified report

DESCRIPTORS: *Cybernetics, *Control systems, *Digital computers, Automation, Production, Memory devices, Remote control systems, Information theory, USSR.

General purpose digital computers and cybernetic machines can be regarded as converters of information, capable in principle of performing in any circuit of automatic control. Restrictions emerging unavoidably in practice are associated not with qualitative peculiarities of these machines, but with limitation of their quantitative characteristics (high speed primarily), and also with economic considerations. Automation of labor of control engineers, managing rather complex industrial objects, presently constitutes a major application area of general purpose electronic digital cybernetic machines. The effect thus achieved improves control quality and economic indices. (Author)

AD-292 255 Div. 30, 25
(TISTM/EJH) OTS price $5.60

Boeing Co., Seattle, Wash.
AN ASSESSMENT OF THE ERRORS INVOLVED IN THICK-FILM HEAT TRANSFER MEASUREMENTS,
by Peter A. Ross. 5 Dec 62, 47p. incl. illus. tables, 4 refs. (Document no. D2-22006)
Unclassified report

DESCRIPTORS: *Gages, *Calorimeters, *Shock tubes, *Heat transfer, Films, Platinum, Heat resistant glass, Errors, Calibration, Laboratory equipment, Mathematical analysis, Measurement.

A study of the calibration procedure for the thick-film gage constant (R.C1/(R alpha sub o)) was made to establish calibration accuracy. It was found that the (R alpha) sub o determination by the water-bath method was uncertain within ±8% due to Joule heating effects. Analysis of the Joule heating effects led to improvements in the measurement technique, which reduced the (R alpha) sub o error to ±0.5%. The error associated with the manufacturer's values of P and C at a reference temperature of 0 C was found to be ±1%. For gage temperatures above 0 C no recommended values are given. Another large uncertainty is in the measurement of 1 which is fixed at ±10% with current measurement techniques. This error, in fact, is the predominant contribution to over-all calibration error at the reference gage temperature (0 C) which is ±10%. It was found that relative heat transfer measurements under uniform flow conditions in the shock tube can be obtained within an accuracy of ±4%. Thus, for gage temperature variation in the vicinity of 0 C, the absolute heat transfer measuring accuracy by virtue of the ±10% calibration error, is about ±11%. (Author)

AD-292 317 Div. 30
(TISTE/CRJ) OTS price $4.60

Navy Electronics Lab., San Diego, Calif.
MICROELECTRONIC LOGIC IMPLEMENTATION FOR THE AN/UYK-1 COMPUTER,
by G. R. Potterf and W. G. Gannon. 31 Oct 62, 40p. incl. illus. (Research rept. no. NEL 1144)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Computer logic, *Digital computers, Very high frequency, Trigger circuits, Triggered gates, Simulation, Electronic circuits, Computers, Feasibility studies.

Investigation concerned the technical, operational, and cost problems involved in the microminiaturization of portions of the AN/UYK-1 computer. In particular, the feasibility of constructing the logic section of the computer with integrated circuit elements was investigated. Construction of the AN/UYK-1 state counter with integrated circuitry showed that integrated elements operate satisfactorily at the AN/UYK-1 frequency of 0.33 mc. The integrated circuit elements tested tolerated power supply variations of at least ±30%. The operation of the integrated circuit elements was not affected by noise in the breadboard circuits. The integrated circuit devices were relatively expensive, but prices have since been reduced and further reductions are expected. (Author)

AD-292 341 Div. 30
(TISTE/OHD) OTS price $5.60

RCA Defense Electronic Products, Camden, N. J.
TAPE ADAPTATION AND CONTROL UNIT.
Final rept.,
by A. W. Muoio. Dec 62, 45p. incl. illus. table (Rept. no. SC-TDP-TACU-01)
(Contract AF 30(602)2563, Proj. 4027)
(RADC TDR 62-204)
Unclassified report

DESCRIPTORS: *Magnetic recording systems, *Digital recording systems, *Data processing systems, *Data storage systems, Digital computers, Magnetic tape, Research program administration, Programming.

The tape adaptation and control unit provides the necessary logic and control circuitry to permit a computer to control and transfer data to any one of eight magnetic tape stations. Three types of magnetic tape stations may be used. Computer input-output transfer time may be minimized by the future modular addition of a magnetic core buffer. This report presents a detailed narrative of the analysis and design work performed on the first phase of the TACU program; namely, the design phase. The introduction contains a description of the TACU program, a general background of the problem, and a breakdown of the design phase into the various sub-tasks. The discussion contains the system analysis, system and logical design, circuit design, mechanical design, power supply design, reliability, maintainability, and error detection and correction of TACU. A PERT chart illustrates the major sub-tasks and their interrelationships. (Author)

AD-292 613 Div. 30, 2
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SPECTROHELIOGRAPH OF THE GORNAYA ASTRONOMICAL STATION OF THE MAIN ASTRONOMICAL OBSERVATORY OF THE ACADEMY OF SCIENCES OF THE USSR,
by R. S. Gnevysheva. 28 Nov 62, 6p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-1429 from Solnechnyye Dannyye, No. 7, pp. 65-68, 1960)
Unclassified report

DESCRIPTORS: *Spectrophotometers, *Sun, *Astronomical observatories, Translations, USSR.

AD-292 621 Div. 30
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
UNIVERSAL AUTOMATIC DIGITAL COMPUTER, ''URAL-2''.
28 Nov 62, 10p. incl. illus. tables, 2 refs. (Trans. no. FTD-TT-62-1237 from Vychislitel'nyy Tsentr, Akademiya Nauk SSSR, pp. 290-297, 1960)
Unclassified report

DESCRIPTORS: *Digital computers, Mathematical logic, Sequences, Programming, Magnetic tape, Magnetic recording systems, Data storage systems, Automatic.

The URAL-2 computer is intended for solving scientific and engineering problems at scientific research institutions, construction bureaus, etc. It can solve a broad class of mathematical and logical problems by automatically executing the programmed sequences of arithmetical and logical operations. URAL-2 computer of parallel action with variable tact duration operates at an average speed of 5000-6000 operations per second. Round-the-clock operation of the machine is possible. Useful time is no less than 18 hours per day. Disruptions in the solutions of problems with cut off of computer is permissible. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-292 652 Div. 30
(TISTB/DGH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
POLICY ISSUES INVOLVED IN THE CONDUCT OF MILITARY DEVELOPMENT PROGRAMS,
by Burton H. Klein. Oct 62, 29p. (Paper no. 2648)
Unclassified report

DESCRIPTORS: *Military research, *Research program administration, Public opinion, Effectiveness.

AD-292 659 Div. 30
(TISTP/TL) OTS price $1.10

Foreign Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTERNATIONAL SYSTEM OF UNITS.
8 Nov 62, 7p. incl. tables (Trans. no. FTD-TT-62-1354 from Tsvetnyy Metally, No. 3, pp. 88-91, 1962)
Unclassified report

DESCRIPTORS: *Conferences, *Measurement, *Physics.

AD-292 660 Div. 30, 15
(TISTM/RGR) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATION.
4 Dec 62, 67p. incl. illus. tables, 5 refs.
(Trans. no. FTD-TT-62-813 from Avtomatyka, No. 1, pp. 3-24, 26-31, 33-45, 1961)
Unclassified report

DESCRIPTORS: *Automation, Translations, Control systems, Feedback amplifiers, Stability, Magnetic drives, Servo systems, Differential equations, Functions, Stabilization, Nonlinear differential equations, USSR.

Contents:
Association of invariance theory with the theory of differential regulators
The possibility of compensation and recompensation of other (excluding static) error components in differential systems
Comparison of rigidity and stability of differential stabilization systems
The possibility of compensating the effects of nonlinearities in various components of differential systems
Utilization of a differential system for the elimination of the insensitive zone in a magnetic reversing gear
The equivalence condition of systems of differential equations and disturbance control systems
Designing automatic systems stable with respect to disturbances
Determination of the form for the transfer functions of components added to a system to achieve invariance
Determination of corrective element parameters
Evaluation of different methods for introducing corrective elements into the system
Determination of the effect of low-value corrective element parameters on process stability and quality in stabilization systems

AD-292 678 Div. 30, 15
(TISTP/WH) OTS price $1.60

Hughes Aircraft Co., Culver City, Calif.
EFFECT OF DEGRADED OPERATIONAL MODES ON THE ACCUMULATION OF ERRORS IN NUMERICAL INTEGRATION. PART I. TRAPEZOIDAL RULE,
by A. Holick. 1 Dec 62, 9p. incl. tables, 5 refs.
(Rept. no. SRS-596)
(Contract AF 04(695)210)
Unclassified report

DESCRIPTORS: *Control systems, *Digital systems, *Integration, *Numerical methods and procedures, Errors.

The effect of degraded operational modes (word split technique) on the accumulation of errors in numerical integration was analyzed and formulas for the first two error moments were derived. The variance of the degraded mode error is indirectly proportional to the number of integration steps for constant mission time and decreases, therefore, with decreasing length of the integration cycle. It seems realistic to permit work split technique if the standard deviation of the degraded mode error is smaller than the sum of the truncation error and the standard deviation of the round-off error in the failure free mode. (Author)

AD-292 695 Div. 30, 32
(TISTB/DGH) OTS price $4.60

International Business Machines Corp., Poughkeepsie, N. Y.
SIMULATION AND GAMING: THEIR VALUE TO THE STUDY OF PRICING AND OTHER MARKET VARIABLES,
by Martin Shubik. 19 Nov 62, 44p. incl. illus. 20 refs. (Research rept. no. RC-833)
(Contract Nonr-377500, Proj. NR 047-040)
Unclassified report

DESCRIPTORS: *Games theory, *Economics, Design, Growth, Economic conditions, Simulation.

A review is given of the current state of the development of simulation and gaming with special reference to two applications to economic problems. A critique of current work and a discussion of present trends are presented. (Author)

AD-292 697 Div. 30
(TISTB/DGH) OTS price $3.60

System Development Corp., Santa Monica, Calif.
INTRODUCTION TO MANAGEMENT CONTROL SYSTEMS RESEARCH,
by J. Kagdis and M. R. Lackner. 15 Oct 62, 30p. incl. illus. refs. (Technical memo. no. TM-708/100/00)
Unclassified report

DESCRIPTORS: *Management engineering, Control systems, Commerce, Decision making, Simulation, Programming.

Efforts are being directed to: (1) develop a well-formulated model of the elements, characteristics and structure of management control systems, (2) develop a general-purpose computer model for simulation, (3) design the decision rules for management controls, and (4) study the behavior of the computer model to gain insight into the problem and validate experimental conclusions. (Author)

AD-292 706 Div. 30, 32
(TISTB/DGH) OTS price $19.75

Wayne State U., Detroit, Mich.
RESEARCH IN MACHINE TRANSLATION. RUSSIAN-ENGLISH.

VOLUME II.
Annual rept. no. 4,
by H. H. Josselson. 31 Aug 62, 284p.
(Contract Nonr-256200)
Unclassified report

DESCRIPTORS: *Machine translation, *Dictionaries, Programming, Language, USSR, Vocabulary.

AD-292 796 Div. 30
(TISTB/DGH) OTS price $1.10

Control and Information Systems Lab., Purdue U., Lafayette, Ind.
ADAPTIVE LEARNING SYSTEMS,
by J. E. Gibson. 1962, 5p. 5 refs.
(Grant AF AFOSR 62-351)
Unclassified report

DESCRIPTORS: *Control systems, *Cybernetics, Theory, Automatic, Learning.

A learning system is defined as a generalization of an adaptive control system. Basic learning system functions such as pattern recognition and the training sequence are discussed. Two proposed learning systems are described and some results are given to demonstrate the theoretical advantage of a system with learning. Studies are incomplete at this time and the paper should be considered as an informal introduction to one point of view on learning systems. (Author)

AD-292 944 Div. 30
(TISTP/WH) OTS price $11.00

California U., Berkeley.
SYMBOLIC ADDRESS CODING BASED ON ALGOL,
by R. S. Lehman. Sep 62, 142p. incl. table, 6 refs. (Technical rept. no. 62-4)
(Contract Nonr-22280)
Unclassified report

DESCRIPTORS: *Programming, *Digital computers, *Coding, *Instruction manuals.

A system of symbolic address coding is described which is based on ALGOL 60 (BOA). In using this system the programmer first writes a complete description of the computational process in the standard ALGOL 60 reference language and then translates this ALGOL program into a symbolic address code suitable for assembly by the FAP assembler. The system consists of a set of rules for translating to make the symbolic coding correspond closely to the original ALGOL test, and a set of subroutines to simplify the use of subscripted variables, switches, and recursive procedures. Subroutines for input and output and evaluation of certain standard functions are also included. (Author)

AD-292 955 Div. 30, 6
(TISTW/DLW) OTS price $7.60

Aerospace Corp., Los Angeles, Calif.
TECHNIQUES FOR MEASUREMENT OF REDUCED RADAR CROSS SECTIONS,
by C. G. Bachman, H. E. King, and R. C. Hansen. Oct 62, 67p. incl. illus. 54 refs. (Rept. no. TDR-930(2119)TN-1, reissue A)
(Contract AF 04(695)169)
(BSD TDR 62-300) Unclassified report

DESCRIPTORS: *Radar echo areas, *Test facilities, Reduction, Antiradar coatings, Test methods, Radar interference, Measurement, Radar reflections.

Problems of measuring low radar cross sections of objects which are physically large are investigated. Three salient problems are the determination of the required distance between antenna and target, reduction of the background scattering, and provision for a target support of negligible cross section. Five types of cross section ranges are described. These types are the indoor anechoic chamber, the radome-enclosed chamber, the conventional outdoor range, the ground plane outdoor range, and the oblique range in which the target is suspended at an oblique angle above ground. It is concluded that for the measurement of microwave radar cross sections in the range 0.01 lambda squared to 0.0001 lambda squared for targets of physical size of the order of several wavelengths or larger the ground plane range and the oblique range offer considerable promise. (Author)

AD-292 975 Div. 30, 15
(TISTP/JW) OTS price $5.60

Office of Aerospace Research, Washington, D. C.
HISTORY OF MATHEMATICAL STATISTICS RESEARCH AT THE AERONAUTICAL RESEARCH LABORATORIES,
by Harry J. Eisenman. 1962, 52p. incl. illus. tables, refs. (Rept. no. OAR-10)
Unclassified report

DESCRIPTORS: *Research program administration, *Mathematics, *Air force research, Laboratories, Statistical processes, Analysis, Applied mathematics.

AD-293 106 Div. 30
(TISTB/DGH) OTS price $3.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
ASO EXECUTIVE ROUTINE.
Technical rept.,
by Benson Perry. 8 Nov 62, 32p. incl. illus.
(Rept. no. 63-14)
(Contract Nonr-55140)
Unclassified report

DESCRIPTORS: *Information retrieval, *Programming, *Data storage systems, Computers, Simulation, Design, Theory, Configuration, Display systems.

A pilot model of a real-time information storage and retrieval system was constructed. Several files are stored in a large, intermediate speed, random access storage device which is an IBM 1405 disk file. Associated with this file are trees (hierarchical index files) and various programs that are needed to retrieve, to store and to update the information files. These are also stored on the disk. The method used to access the files by tracing one or more keys through the trees is the Multi-List technique. All information to and from the 1405 disk passes through an IBM 1401 processor which also does all of the actual processing. A diagram representing the system is given. One of the important features in the system is the division of programs into two priorities with the ability to interrupt a low priority program with a high priority one. The high priority is reserved for programs that provide immediate, low volume output in response to inquiries regarding the files. Certain features, originally planned for the Executive Routine, were omitted because of the limitations of the 1401 system available. In particular, the small memory (8000 character total, 2000 characters for the Executive Routine) was an important factor. Some details of the originally proposed Executive Routine are appended. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-293 155 Div. 30, 15, 26
(TISTP/WH) OTS price $1.60

Operations Evaluation Group, Office of Naval Research, Washington, D. C.
FORTRAN PROGRAM TO ESTIMATE CUMULATIVE SURVIVAL PROBABILITY AND VARIANCE,
by Robert L. Hubbard. 31 Oct 62, 13p. incl. illus. tables, 4 refs. (Rept. no. IRM-28)
Unclassified report

DESCRIPTORS: *Digital computers, *Programming, *Reliability, *Statistical distributions, *Survival, *Analysis of variance.

A computer program was devised to examine the survival times of test elements to estimate survival probability as a function of time. Input quantities consist of: (1) ages of elements at start of test, (2) ages of elements at times of failure, and (3) ages of elements when withdrawn from test prior to failure. The principal output quantities are (1) the expected value of survival probability at the age associated with each observed failure, and (2) the variance and standard deviation associated with each probability estimate. The use of elements from truncated tests serves to take advantage of the largest possible sample size for a given time period without introducing a biased survivability estimate. (Author)

AD-293 208 Div. 30, 6, 12
(TISTW/DLW) OTS price $1.10

General Electric Co., Syracuse, N. Y.
MISTRAM AUXILIARY CHECKOUT KIT TECHNICAL NOTES. Report on Precision Missile Trajectory Measurement System.
1 Sep 62, 10p. incl. illus. tables.
(Contract AF 08(606)3776)
(AFMTC TN 61-7) Unclassified report

DESCRIPTORS: *Radar beacons, *Test sets, *Guided missile tracking systems, *Radar tracking, Calibration, Airborne, Guided missiles (Surface-to-surface), X band, Test equipment, Ground support equipment, Radio interferometers.

The MISTRAM Auxiliary Checkout Kit (MACK) is used for testing the transponder in a missile before launch to verify transponder capability to receive and re-transmit the proper X-band signals necessary for MISTRAM operation. The MACK equipment consists of the transmitter cabinet, the console receiver cabinet, and the antenna. Capabilities of the MACK were demonstrated by operating the MACK in conjunction with an airborne transponder located about three miles away. Operating MACK with the transponder verified that the transponder, via an air link, can receive, phase-lock, and re-transmit the required X-band signals necessary for proper transponder operation with the MISTRAM ground system. (Author)

AD-293 210 Div. 30
(TISTP/JW) OTS price $4.60

Computer Sciences, Inc., Plainview, N. Y.
TANK COMPUTER MINIATURIZATION STUDY.
Final engineering rept.
1962, 33p. incl. illus.
(Contract DA 30-069-ORD-3439)
Unclassified report

DESCRIPTORS: *Miniature electronic equipment, *Analog computers, Stabilization, Reliability, Range finding, Tanks, Errors, Fire control computers.

AD-293 241 Div. 30
(TISTB/DGH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
COMPUTER SIMULATION OF NEUROPHYSIOLOGICAL AND SOCIAL SYSTEMS,
by Harold Borko. 12 Oct 61, 9p. incl. illus. 5 refs. (Rept. no. SP-508)
Unclassified report

DESCRIPTORS: *Computers, *Simulation, Social sciences, Psychology, Nervous system, Diagnosis, Sociology, Political science, Feasibility studies, Nerves.

This paper discusses the use of the computer as a simulation device for studying complex neurophysiological and social systems. Rather than reporting on one specific research project in detail, it describes some of the interesting developments taking place in the field of computer simulation throughout the country. (Author)

AD-293 243 Div. 30
(TISTP/JW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
THE COMPUTER IN THE CLASSROOM,
by Don D. Bushnell. 14 Nov 61, 11p. incl. illus. (Rept. no. SP-601)
Unclassified report

DESCRIPTORS: *Teaching machines, *Computers, Learning, Education.

AD-293 293 Div. 30, 9, 4
(TISTM/EJH) OTS price $1.10

Marine Lab., U. of Miami, Coral Gables, Fla.
X-RAY DIFFRACTION ANALYSIS OF CALCIUM CARBONATE,
by Eric Olausson and Oiva Joensuu. Oct 62, 4p. incl. tables, 4 refs. (Technical rept. nos. 62-10; 8825; ML 62419)
(Contract Nonr-84001)
Unclassified report

DESCRIPTORS: *Calcium compounds, *Carbonates, *Calcite, *X-ray diffraction analysis, Powders, Preparation, High pressure research, Quantitative analysis, Oceanography, Fluorides, Sedimentation, Minerals.

The purpose of this study was the acquisition of data concerning factors affecting quantitative analysis of calcite and aragonite in deep-sea cores by use of X-ray diffraction. Factors to be controlled in the preparation of the powdered samples include the amount of mineral grains, their surface condition, size, shape, and orientation on the target area. Pressure and grinding effects are discussed. Experiments were made to establish a standard curve for percentage estimation of calcite in sediment samples, based on the relation between the percentage of calcite and the calcite/fluorite intensity ratio. Two different relations were obtained between the content of calcite and the calcite/fluorite intensity ratio. Two different relations were obtained between the content of calcite and the calcite/fluorite intensity ratio; for example, for a fraction 4 - 8 microns and intensity ratio of 0.8, the percentage of calcite could be assumed to vary from 30 to 50%, dependent upon whether the coccolith or the foram curve is used. In deep-sea carbonate oozes, the coccolithophoridae/foraminifera ratio changes from area to area and from time to time.

AD-293 442 Div. 30, 15
(TISTP/WH) OTS price $11.00

Applied Mathematics and Statistics Lab., Stanford U., Calif.
INTERVAL ARITHMETIC AND AUTOMATIC ERROR ANALYSIS IN DIGITAL COMPUTING,
by R. E. Moore. 15 Nov 62, 134p. incl. illus. 21 refs. (Technical rept. no. 25)
(Contract Nonr-22537, Proj. NR 044-211)
Unclassified report

DESCRIPTORS: *Digital computers, *Errors, *Difference equations, *Integral equations, *Groups (Mathematics), *Series, Numerical methods and procedures, Analysis.

Contents:
Introduction
Interval arithmetic
The continuity of interval arithmetic
Refinements
Interval integrals
The initial value problem in ordinary differential equations
Digital computing

AD-293 444 Div. 30, 9
(TISTP/JW) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
A DYNAMIC NETWORK FLOW ALGORITHM PROGRAMMED FOR THE IBM 7090,
by Alvin L. Schreiber. Nov 62, 45p. incl. illus. tables, 3 refs. (Rept. no. 1656)
Unclassified report

DESCRIPTORS: *Computers, *Fluid flow, Mathematical analysis, Programming, Dynamics, Computer logic, Nets.

A program is written, for the IBM 7090, to solve a dynamic capacitated network for flows and their decompositions for all time periods. An algorithm was derived which obtains maximal dynamic flows of a commodity through a given network for all time periods. The network consists of a given number of nodes and arcs. Two of the nodes are distinguished in that all flow originates from one of them, called the source, and terminates in another, called the sink. Each arc is directed from node i and node j and has two positive integers associated with it, traversal time tij and capacity Cij. Thus, C units of the commodity can be shipped from node i to node j in t time periods. At each node, where units of the commodity are received, they may be either transshipped immediately or held for later transshipment. Any pair of nodes may have 0, 1, or 2 arcs connecting them, subject to three restrictions: (1) no arcs may enter the source, (2) no arcs may leave the sink, and (3) no pair of nodes may be connected by two arcs running in the same direction. (Author)

AD-293 449 Div. 30
(TISTP/JW) OTS price $5.60

University Coll., London (Gt. Brit.).
COMPUTER PROCESSING OF ACOUSTIC AND LINGUISTIC INFORMATION IN AUTOMATIC SPEECH RECOGNITION.
Technical rept.,
by P. Denes. 31 Mar 62, 52p. incl. illus. tables, 15 refs.
(Contract AF 61(514)1176)
(AFCRL 62-916) Unclassified report

DESCRIPTORS: *Speech transmission, *Computers, Acoustics, Language, Data processing systems, Spectrographic analysis, Frequency, Voice communication systems, Analog-to-digital converters, Wave characteristics.

The use of computers in automatic speech recognition is discussed and equipment used in the analog to digital conversion and recording of speech wave data for processing in the computer is described. The development and construction of associated apparatus for the visual inspection of speech waves is also described; this includes the instantaneous sound spectrograph for immediate viewing of the speech wave spectrum, the continuous photographic spectrograph for obtaining a permanent record of the speech wave, and the speech microscope for detailed inspection of wave shapes and the measurement of fundamental frequencies. Finally, the report describes a computer program providing information about the distribution of English phonemes from phonetically transcribed material, and presents a statistical analysis of the results. (Author)

AD-293 489 Div. 30, 6, 12
(TISTW/DLW) OTS price $6.60

Space Technology Labs., Inc., Redondo Beach, Calif.
A COMPUTER PROGRAM FOR DETERMINING RADAR TRACKING INFORMATION FROM MISSILE POSITION, VELOCITY AND ATTITUDE DATA,
by L. R. Maynard. Nov 62, 55p. incl. illus.
(Rept. no. 6301-6343-TU-000)
(Contract AF 04(694)3)
(BSD TDR 62-353) Unclassified report

DESCRIPTORS: *Radar tracking, *Programming, *Guided missile trajectories, *Guided missile tracking systems, *Instrumentation, Launching sites, Position finding, Velocity, Doppler tracking, Test facilities, Computers, Mathematical computer data, Simulation, Doppler radar, Safety.

A computer program, in Fortran Assembly Program (FAP) symbolic and FORTRAN, is developed that provides radar tracking data in a format that satisfies the Pacific Missile Range General Electric Range Safety and Instrumentation System requirements for launch support. Input to the program are the radar and launch site locations (geodetic and astronomic), Earth Centered Inertial coordinates of the missile position and velocity and missile attitude direction cosines. (Author)

AD-293 613 Div. 30
(TISTP/JW) OTS price $9.60

Digital Computer Lab., U. of Illinois, Urbana.
FURTHER STUDIES IN SPEED-INDEPENDENT LOGIC FOR A CONTROL,
by Robert Earl Swartwout. 13 Dec 62, 104p. incl. illus. refs. (Rept. no. 130)
(Partially sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: *Digital computers, *Computer logic, Reliability, Velocity, Design, Electronic circuits, Operation, Control systems.

AD-293 695 Div. 30
(TISTP/JW) OTS price $.75

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AUTOMATIC SELECTION OF DIGITAL ELECTRONIC COMPUTERS (ASDEC),
by Martin H. Weik, Violet J. Confer and Ralph R. Rosenberg. Oct 62, 23p. (BRL rept. no. 1176)
(Proj. 503-06-002)
Unclassified report

DESCRIPTORS: *Digital computers, *Data processing system, Research program administration, Electronic equipment, Selection.

Engineering and programming condensed descriptions of 327 electronic digital computing and data processing systems in the United States are given in a set of comparative charts, automatically prepared from a deck of punched cards. A method for automatic selection and evaluation of computing and data processing systems is described. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-292 149 Div. 31
(TISTE/CRJ) OTS price $3.60

RAND Corp., Santa Monica, Calif.
DETERMINATION OF DISPLACEMENT OF DRY CARGO SHIPS IN THE EARLY DESIGN STAGES,
by Erich C. M. Danckwardt, tr. by H. B. Benford and M. O. Kramer. Nov 62, 33p. incl. illus. table, 9 refs. (Memo. no. RM-3400-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Cargo ships, Physical properties, Load distribution, Materials, Steel, Marine engines, Construction, Mathematical analysis, Ship hulls, Steam turbines, Boilers, Machines.

This effort is based on work that was pursued with the object of developing a method that would show the main dimensions of any projected ship during the early design stages. The approach explained is completely novel. The reported methods and the determination of the correction factors that go with it can be used for many other preliminary design cases and can furnish valuable information in these cases as well. The method is based on the separation and individual treatment of the various weight groups such as steel outfitting and machinery. These individual weights were determined as functions of the design requirements. (Author)

AD-293 691 Div. 31, 9
(TISTE/CRJ) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
EFFECT ON HULL VIBRATIONS OF VARIOUS BOW ANTI-PITCHING FIN CONFIGURATIONS,
by G. P. Stefun and F. M. Schwartz. Nov 62, 48p. incl. illus. tables, 10 refs. (Rept. no. 1659)
Unclassified report

DESCRIPTORS: *Naval vessels, *Ship hulls, *Fins, Hydrodynamics, Pitch, Reduction, Model tests, Stability, Measurement, Vibration.

Results from model and full-scale observations and measurements indicate that serious transverse hull vibrations are induced by bow antipitching fins. The vibrations are believed to be caused by hydrodynamic impacts due to flow separation effects that occur for large amplitudes of fin motion. Model experiments of various fin configurations were conducted in waves to determine the effects of changes in fin shape, orientation, and depth of submergence on vibrations and pitching. Minimum vibrations were obtained for fins with high aspect ratios, tip fences, and deep submergence. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-291 965 Div. 32, 17, 14
(TISTM/TCG) OTS price $7.60

Defense Metals Information Center, Columbus, Ohio.
SELECTED ACCESSIONS,
comp. by Karen Barnes. June 62, 56p. refs.
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Documentation, *Scientific reports, *Heat resistant alloys, *Metals, *Refractory materials, *Coatings, Ceramic materials, Composite materials, Alloys, Indexes, Bibliography.

AD-292 169 Div. 32
(TISTA/FRL) OTS price $1.10

RAND Corp., Santa Monica, Calif.
REVIEW OF BOOK PLANETS AND SATELLITES,
by W. W. Kellogg. Dec 62, 2p. (Rept. no. P-2680)
Unclassified report

DESCRIPTORS: *Literature, *Reports, *Planets, *Satellites, Solar systems, Moon.

AD-292 170 Div. 32
(TISTB/DGH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
AN ECONOMETRIC MODEL OF METROPOLITAN DEVELOPMENT,
by John H. Niedercorn and John F. Kain. Dec 62, 38p. incl. illus. (Rept. no. P-2663)
(In cooperation with Air Force Academy, Colo.)
Unclassified report

DESCRIPTORS: *Urban areas, Distribution, Measurement, Simulation, Theory, Mathematical analysis, Growth.

Regional and urban economics have not yet accorded econometric models the same wide acceptance that they now enjoy in Economics. The econometric technique appears to be a useful and efficient tool for studying regions. This method has been applied to the study of urban land-use problems. Presented is a dynamic cross-sectional econometric model describing population and employment changes which have taken place in the 39 largest Standard Metropolitan Statistical Areas (SMSAs) during the 1954-1958 period. Our present urban structure analysis proceeds in several discrete steps. First, we determined changes in population and manufacturing employment for the entire SMSA. These changes, representing perhaps the most important kind of basic employment, are partitioned between the Central City and the Metropolitan Ring. Finally, changes in retailing, wholesaling and selected service employments are derived for both the Central City and Metropolitan Ring. (Author)

AD-292 251 Div. 32
(TISTB/DGH) OTS price $4.60

Hebrew U. (Israel).
IMAGES PERTAINING TO CHOICE OF OCCUPATION, THEIR SOURCES AND THEIR INFLUENCE ON THIS CHOICE,
by H. Weihl and E. Yuchtmann. Oct 62, 42p. incl. illus. tables (Technical note no. 6)
(Contract AF 61(052)480)
Unclassified report

DESCRIPTORS: *Sociology, *Israel, *Sociometrics, Behavior, Attitudes, Rearing, Positioning reactions, Job analysis, Determination, Analysis.

Having regard to a model of role as its general framework, the potential influence of certain pre-situational factors on role functioning is discussed. We have dealt mainly with motivation as one of such factors, aiming to locate some of the factors contributing to its formation. An examination of the relationship between pre-situational factors and actual role-performance would have necessitated a follow-up study of the respondents on their taking up their various occupational roles. Though such a study was not available, the existing empirical material enabled us to show that without considering pre-situational factors such as motivation, no clear understanding of proper role functioning, as well as of motives governing choice of an occupational role (or any role), could be achieved. (Author)

AD-292 711 Div. 32, 30
(TISTM/RGR) OTS price $14.50

Wayne State U., Detroit, Mich.
RESEARCH IN MACHINE TRANSLATION, RUSSIAN-ENGLISH. VOLUME I.
Annual rept. no. 4, 1 Sep 61-31 Aug 62,
by H. H. Josselson. 31 Aug 62, 218p. incl. illus. tables.
(Contract Nonr-256200)
Unclassified report

DESCRIPTORS: *Machine translation, *Language, Documentation, Computer logic, Mathematics, Dictionaries, USSR.

This is the fourth annual report on machine-aided translation research from Russian into English. In the course of the current contract year (September 1, 1961-August 31, 1962) the research work carried on by the Wayne State University group has been concentrated in the following areas: (1) completing a mechanical system for processing certain phases of the research; (2) evaluating and improving the syntactic routines; (3) adding to the syntactic routines; (4) studying the distributional properties of the dative case in Russian; and (5) forming, correcting, improving, and expanding the Russian-English glossary based on mathematical text. (Author)

AD-292 750 Div. 32
(TISTP/EHH) OTS price $3.00

Armed Services Technical Information Agency, Arlington, Va.
HANDBOOKS: AN ASTIA REPORT BIBLIOGRAPHY,
comp. by Elizabethe H. Hall. 30 Nov 62, 1v. 910 refs.
Unclassified report

DESCRIPTORS: *Handbooks, *Instruction manuals, *Textbooks, *Dictionaries, *Encyclopedias, *Bibliography, Reports, Scientific reports.

This bibliography is a listing of handbooks, instruction manuals, textbooks, dictionaries, and encyclopedias cataloged by ASTIA from 1952 through November 1962. The 910 references cited herein cover a wide range of subject areas corresponding to the thirty-three divisions in the ASTIA Distribution Guide. This volume of handbooks is restricted to unclassified and unlimited references. Within each subject area, reports prepared by Department of Defense contractors are arranged alphabetically by source, contract, and title; military reports are arranged by source and title. The classified, limited unclassified references of this bibliography appear as a separate volume.

AD-292 900 Div. 32
(TISTB/DGH) OTS price $2.60

American U., Washington, D. C.
CUBA SINCE CASTRO. A BIBLIOGRAPHY OF RELEVANT LITERATURE,
by Barbara Reason, Margaret B. Mughisuddin and Bum-Joon Lee Park. Nov 62, 25p.
Unclassified report

DESCRIPTORS: *Bibliography, *Cuba, *Communism.

From sources dating back to 1950, approximately 300 leads to books and articles were gathered. These leads were scanned for pertinence and generality, and from this review 186 were selected for inclusion. Each selected item was categorized into the one of five sections of the bibliography to which the item bore greatest relevance. The sections are: (1) the 26th of July Movement and its origins; (2) the major persons in revolutionary Cuba and their dominating ideas and philosophies; (3) the form that anti-Castroism, both within and outside of Cuba, has taken; (4) the growing importance of Russian influence in Cuba and the establishment of missile bases; and finally, (5) the response of American States to the changing and increasingly menacing posture of Cuba. Items have been categorized according to the above breakdown, but an author-title index included at the end of this work will help the reader to locate items easily. (Author)

AD-292 945 Div. 32
(TISTB/CCH) OTS price $7.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
OBSERVATIONS ON THE CONTEMPORARY ESKIMO OF WAINWRIGHT, ALASKA,
by Frederick Milan. Jan 58, 75p. incl. tables, 37 refs. (Technical rept. no. 57-14)
Unclassified report

DESCRIPTORS: *Eskimos, *Ecology, Social sciences, Economics, Sociology, Housing, Culture.

A group of contemporary Alaskan Eskimos, the uluRunikamiut, living in the arctic coastal village of Wainwright was studied during the summer of 1951. The present population numbers 130 males and 96 females. This imbalance in the sex distribution appears due to the cultural factors of migration, methods of population control, and sexual differences in the incidences of various childhood diseases operating upon the normal 1:1 ratio of the sexes at birth. Despite the introduction of a money economy and an annual village income of about $65,000, the cycling seasons still determine the annual round of exploitative activities and there is a definite preference for native type foods. The people are bilingual, speaking both iNNupiaq, or Eskimo, and English. The Wainwright people prefer iNNupiaq to English because much of their culture is expressed in their language; that is, place names, hunting vocabulary, kinship terminology, and a number of words describing their environment. The religious beliefs of the uluRunikamiut are based upon somewhat modified Christian teachings of the Presbyterian Church and a residuum of aboriginal practices. The retention of aboriginal culture patterns is not due to any innate conservatism in the Eskimo people, or due entirely to the influences of the environment, but is more likely part of the over-all adjustment made by a pragmatic people to reality. (Author)

AD-293 107 Div. 32
(TISTB/DGH) OTS price $3.60

Federal Aviation Agency, Washington, D. C.
DIGEST OF ECONOMIC CRITERIA FOR FEDERAL AVIATION AGENCY EXPENDITURES.
Memo. rept.,
by Fred Bohner. Sep 62, 35p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Civil aviation, *Economics, Federal government, Costs, Distribution, Effectiveness, Analysis, Standards, Federal budgets.

The purpose of this study was to determine certain broad principles and economic criteria for Federal Aviation Agency expenditures in order to enable the Agency to establish specific standards and techniques for evaluating over-all and specific research and development, investment, and operating programs commensurate with the nation's future requirements and capabilities. In addition, these criteria were to be applied to the current aviation support system and a measurement taken of the present and future benefits of improving Federal Aviation Agency effectiveness. (Author)

AD-293 246 Div. 32
(TISTB/DGH) OTS price $2.60

System Development Corp., Santa Monica, Calif.
MARGINAL ANALYSIS OF LOST SALES,
by William Karush. Jan 58, 20p. 4 refs. (Rept. no. SP-72)
Unclassified report

DESCRIPTORS: *Economics, Supplies, Quality control, Effectiveness, Measurement, Scheduling, Theory, Statistical processes, Analysis, Costs.

The literature contains papers which deduce, by analytical or computational means, the functional relationship between the measure of effectiveness - lost sales - and the parameter of control inventory level for various problems. Only a minor part of this research effort has been directed toward exploring general properties of this functional relationship, which remain valid for broad classes of problems. The purpose of this paper is to study such a property; namely, that the marginal value of additional inventory is decreasing with increasing inventory - i.e., that lost sales is a (decreasing) convex function of inventory level. (Author)

AD-293 251 Div. 32
(TISTB/DGH) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CONCERNING THE PROBABILITY THAT A GIVEN PAPER WILL BE CITED,
by M. M. Kessler and F. E. Heart. 5 Nov 62, 19p. incl. illus. tables, 4 refs. (Rept. no. R-6)
Unclassified report

DESCRIPTORS: *Literature, Probability, Analysis, Periodicals, Scientific reports, Indexes.

Each paper in 36 volumes of the Physical Review was counted as it appeared in the bibliography of every other paper in the same set of volumes. It was found that citation in the subsequent literature is a very low-probability event. (Author)

AD-293 682 Div. 32
(TISTM/ODN) OTS price $1.10

RAND Corp., Santa Monica, Calif.
USE OF GAMES IN ECONOMIC ANALYSIS,
by Frederick B. Thompson. 17 June 54, 2p. (Rept. no. P-536A)
Unclassified report

DESCRIPTORS: *Games theory, *Economics, Analysis.

A new econometric model structure is discussed. The two goals underlying its development are: (1) to find a structure which could handle situations involving the results of interaction of large numbers of simple elements over time under a centralized control; (2) to find a structure which is reasonably computable so that various control policies could be tested and compared. The presentation of the structure is divided into three parts: first, its motivation from the point of view of the operations analyst, of the economist and of the mathematicians; second, a brief description of it, and third; a discussion of two examples: a model of a complete economy, and a model of an industrial establishment. (Author)

AD-293 252 Div. 32
(TISTP/JW) OTS price $10.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
A LEFT-TO-RIGHT GENERATIVE GRAMMAR OF FRENCH,
by David Allen Dinneen. Dec 62, 1v. incl. illus.
Unclassified report

DESCRIPTORS: *Language, Mechanics, Translations, Synthesis.

33. TRANSPORTATION

AD-293 124 Div. 33
(TISTB/LMH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE DEMAND FOR TRANSPORTATION SERVICES IN A GROWING ECONOMY,
by Charles J. Zwick. 10 Dec 62, 10p. incl. table (Rept. no. P-2682)
Unclassified report

Presented at the 42nd Annual Meeting of the Highway Research Board, 9 Jan 63, Wash., D. C.

DESCRIPTORS: *Transportation, *Commerce, Economics, Consumption, Probability, Population, Sociology.

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

* Descriptors marked with an asterik are included in the subject index.

BIBLIOGRAPHY

ANL-6624 $3.00

Argonne National Lab., Ill.
ARGONNE NATIONAL LABORATORY PUBLICATIONS, 1 July 61-30 June 62. Rept. on Contract W-31-109-eng-38. Oct 62, 201p.

AGRICULTURE

TID-17045 $1.10

Connecticut Agricultural Experiment Station, Storrs.
ION INTERACTIONS IN PLANT TISSUES, by Fred H. Emmert. Progress rept. Jan 62-Jan 63, on Contract AT(30-1)2117. 31 Oct 62, 10p.

ASTRONOMY

AD-285 020 $3.60

Air Force Cambridge Research Lab., Bedford, Mass.
INFRARED CELESTIAL BACKGROUNDS, by R. G. Walker. July 62, 33p. 34 refs. Air Force Surveys in Geophysics no. 149; AFCRL-62-807; NASA N62-16262

DESCRIPTORS: *Infrared spectroscopy, *Celestial mechanics, Stars, Solar systems, Blackbody radiation, Temperature, Galaxies, Atmosphere, Radiation effects.

A survey of observational data on infrared emission from celestial objects is presented and correlated with recent theoretical calculations. Spectral distribution of the radiation is analyzed with regard to departures from blackbody radiation predictions based upon effective temperatures and stellar spectral classification. Application of these data to infrared systems is discussed and the infrared background radiance values due to the galactic and solar systems are calculated. (Author)

TID-13994 $1.10

Los Alamos Scientific Lab., N. Mex.
AN ALTERNATE TEST OF "BAILEY'S HYPOTHESIS", by Robert W. Bussard. Rept. on Contract W7405-eng-36. 10 Oct 61, 3p. 4 refs. LADC-4981.

BIOLOGICAL SCIENCES

BNL-6362 $2.60

Brookhaven National Lab., Upton, N. Y.
THE ANALYSIS OF CELL POPULATION KINETICS, by Henry Quastler. 13 Nov 62, 25p. 8 refs.

BNL-6342 $4.60

Brookhaven National Lab., Upton, N. Y.
THE COMBINED APPLICATION OF LYMPH DUCT DRAINAGE AND EXTRACORPOREAL IRRADIATION OF THE BLOOD IN THE STUDY OF LYMPHOPOIESIS, by E. P. Cronkite, C. R. Jansen and others. 9 Nov 62, 46p. 23 refs.

TID-17082 $5.60

California U., Los Angeles, School of Medicine.
RENAL BLOOD FLOW, by George V. Taplin. Rept. on Contract AT(04-1)GEN-12. 24 Oct 62, 57p. 43 refs.

AD-276 892 $9.10

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
BIOLOGICAL EFFECTS OF BLAST, by Clayton S. White. Technical progress rept. on Contract DA 49-146-XZ-055. Dec 61, 105p. 41 refs. Rept. no. DASA 1271.

Presented before The Armed Forces Medical Symposium Field Command, Defense Atomic Support Agency, Sandia Base, Albuquerque, New Mexico, 28 Nov 61.

DESCRIPTORS: *Blast, *Acceleration tolerance, *Injuries, Laboratory animals, Nuclear explosions, Nuclear warfare, Radiation injuries, Shielding, Shelters.

The current state of knowledge relevant to biological blast effects was summarized in a selective manner. Initially, five problems of concern to those who would relate the environmental variations produced by nuclear weapons with biological response and hazard assessment were pointed out. Primary, secondary, tertiary, and miscellaneous blast effects were defined and selected interspecies experimental data of a physical and pathophysiological nature useful in estimating human response were presented. Tentative biological criteria defining "safe" levels of exposure were set forth as were survival curves for different conditions of exposure in Hiroshima. These were discussed along with the comparative variations in range of the "free-field" effects as they vary with explosive yield. The fundamental requirement for surviving seconds, minutes, and

hours to abet survival for days, weeks, months, and years was emphasized along with the necessity for planning protective measures against all hazardous weapons effects as one attractive alternative for minimizing casualties and maximizing survival in the event of a nuclear war. (Author)

LF-2 $0.50

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
THE FLORA OF HEALTHY DOGS. I. BACTERIA AND FUNGI OF THE NOSE, THROAT, AND LOWER INTESTINE, by W. E. Clapper and G. H. Meads. Technical progress rept. on Contract AT(29-2)-1013. Sep 62, 27p. 33 refs. NASA N62-17620.

TID-17287 $1.60

Pavia U. (Italy)
INVESTIGATIONS ON MUTABILITY OF POLYGENES AND ON UTILIZATION OF INDUCED GENETIC VARIABILITY, by R. E. Scossiroll. 1 Aug 62, 11p.

PB 162 668 $2.60

Science and Technology Div., Library of Congress, Washington, D. C.
MAGNETISM: ITS EFFECT ON LIVING MATTER. A BIBLIOGRAPHY, by Morris C. Leikind and Jack Weiner. Rept. on Contract NAonr-13-47. Mar 49, 21p. 83 refs.

DESCRIPTORS: *Bibliography, *Magnetism, Biology, *Terrestrial magnetism, *Birds, Navigation, Magnets, Electromagnets, Therapy, *Animals, *Plants.

The scope of this bibliography has been limited to those papers which represent serious attempts to study observable or experimentally controlled effects of physical magnetism on living matter. The term physical magnetism has been taken to include that of terrestrial, natural, or electromagnetic origin. (Author)

Biochemistry

TID-17016 $1.10

Arkansas U., Fayetteville.
STUDIES ON THE PHOSPHORYLATION CYCLE IN THE INTACT ANIMAL, by Jacob Sacks. Annual progress rept. on Contract AT(40-1)1521. 15 May 57, 9p. 3 refs.

TID-17015 $1.10

Arkansas U., Fayetteville.
STUDIES ON THE PHOSPHORYLATION CYCLE IN THE INTACT ANIMAL, by Jacob Sacks. Annual progress rept. on Contract AT(40-1)1521. 20 May 57, 10p. 2 refs.

TID-17075 $1.60

Arkansas U., Fayetteville.
STUDIES ON THE PHOSPHORYLATION CYCLE IN THE INTACT ANIMAL, by Jacob Sacks. Annual progress rept. on Contract AT(40-1)1521. 20 May 57, 13p. 2 refs.

TID-17077 $1.60

Arkansas U., Fayetteville.
STUDIES ON THE PHOSPHORYLATION CYCLE IN THE INTACT ANIMAL, by Jacob Sacks. Annual progress rept. on Contract AT(40-1)1521. 4 June 59, 13p. 3 refs.

TID-17244 $1.60

Cancer Research Inst., New England Deaconess Hospital, Boston, Mass.
THE RESPONSE OF TRYPTOPHAN PYRROLASE TO ADMINISTRATION OF CORTICAL IN DEVELOPING AND ADULT RATS, by Leon Goldstein and W. E. Knox. Rept. on Contract AT(30-1)901. 29 Nov 62, 11p. 23 refs.

RFP-279 $1.60

Dow Chemical Co., Denver, Colo.
THE RADIOCHEMICAL DETERMINATION OF AMERICIUM IN THE PRESENCE OF PLUTONIUM IN URINE, by D. L. Bokowski. Rept. on Contract AT(29-1)1106. 10 Oct 62, 18p. 10 refs.

TID-17048 $1.60

Howard U., Washington, D. C.
DESCRIPTION OF RESEARCH AND RESULTS FOR THE PERIOD 1 MARCH 1962-28 FEBRUARY 1963, by Felix Friedberg. Rept. on Contract AT(30-1)2735. 5 Nov 62, 14p. 7 refs.

UCRL-9805 $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
THE BIOCHEMICAL SYNTHESIS OF D-XYLULOSE AND L-RIBULOSE; DETAILS OF THE ACTION OF ACETOBACTER SUBOXYDANS ON D-ARABITOL, RIBITOL AND OTHER POLYHYDROXY COMPOUNDS, by V. Moses and R. J. Ferrier. Rept. on Contract W7405-eng-48. Aug 61, 24p. 27 refs.

UCRL-10521 $3.60

Lawrence Radiation Lab., U. of California, Berkeley.
THE MECHANISMS OF THE REACTIONS OF THE CARBON REDUCTION CYCLE OF PHOTOSYNTHESIS, by J. A. Bassham. Rept. on Contract W7405-eng-48. Aug 62, 32p. 37 refs.

LF-3 $0.50

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
ULTRAMICRO METHODS IN BIOCHEMISTRY. I. GENERAL CONSIDERATIONS. II. PROCEDURES FOR THE DETERMINATION OF SERUM BILIRUBIN, by E. Van Stewart, Charles R. Puckett, and Agnes Wood. Technical progress rept. on Contract AT(29-2)-1013. Oct 62, 31p. 22 refs. NASA N63-10547.

Botany

AD-268 829 $7.60

Kaiser Foundation Research Inst., Richmond, Calif.
STUDY OF PIGMENT OF PHOTOSYNTHETIC ORGANISMS, by Mary Belle Allen. Final rept. no. 1 on Contract AF 19(604)6636. 14 June 61, 77p. 54 refs. AFCRL-101.

DESCRIPTORS: *Plants, *Algae, *Chlorophylls, *Photosynthesis, Paramagnetic resonance, Electrons, Fluorescence, Measurement, Plant pigments, Absorption spectrum, Photochemistry, *Mutations, Ultraviolet radiation.

Included in the report are:
Evidence for pigments absorbing at 705-710 mu in photo synthetic organisms, pub. in Light and life, pp. 479-482, 1961
Observation of two photoreactions in photosynthesis, pub. in Biochemical and Biophysical Research Communications 4:271-274, 1961.
Measurement of the light absorbed by the pigments in the living cell is necessary for any study of their activities. The errors involved in measurement of absorption in scattering suspensions have been examined. Scattering in suspensions of C. pyrenoidosa varies with the fourth power of the frequency, suggesting the participation of small particles. Absorption curves obtained with the Cary Model 14R spectrophotometer suggest that scattering errors are small in spectra measured with this instrument. A number of mutants of Chlorella pyrenoidosa useful for studies of the role of the various pigments in photosynthesis have been characterized. (Author)

TID-17204 $1.10

Maryland U. School of Medicine, Baltimore.
ACTIVE TRANSPORT OF IONS IN NITELLA, by L. J. Mullins. Annual progress rept. on Contract AT(30-1)2464. 15 Oct 62, 4p.

ORNL-3328 $10.50

Oak Ridge National Lab., Tenn.
CYCLING OF CESIUM-134 IN WHITE OAK TREES ON SITES OF CONTRASTING SOIL TYPE AND MOISTURE, by J. P. Witherspoon, Jr., S. I. Auerbach, and J. S. Olson. Rept. on Contract W7405-eng-26. 6 Nov 62, 139p. 60 refs.

ORO-580 $2.25

Tennessee U., Knoxville.
ACCUMULATION AND CYCLING OF ORGANIC MATTER AND CHEMICAL CONSTITUENTS DURING EARLY VEGETATIONAL SUCCESSION ON A RADIOACTIVE WASTE DISPOSAL AREA. [AND] VEGETATIONAL HISTORY AND PLANT SUCCESSION ON A RADIOACTIVE WASTE AREA, by H. R. DeSelm and R. E. Shanks. Rept. on Contract AT(40-1)-2077. Oct 62, 105p. 219 refs.

Radiobiology

TID-17198 $1.10

Argonne National Lab., Ill.
EFFECTS OF RADIATION ON THE GENERATION CYCLE, by S. Lesher and R. J. M. Fry. Rept. on Contract W31-109-eng-38. 8 Nov 62, 7p.

TID-17191 $1.60

Argonne National Lab., Ill.
THE NATURAL CONTENTS OF RaD (Pb^{210}) AND RaF (Po^{210}) IN THE HUMAN BODY, by Richard B. Holtzman. Rept. on Contract W31-109-eng-38. Aug 62, 19p. 18 refs.

TID-17200 $1.10

Argonne National Lab., Ill.
THE TRANSLOCATION OF Ra DAUGHTERS TO THE SKELETON OF THOROTRAST PATIENTS, by L. D. Marinelli and H. F. Lucas. Rept. on Contract W31-109-eng-38. 8 Nov 62, 10p.

TID-17201 $5.60

Arkansas U. [Medical Center] Little Rock.
TO INVESTIGATE, DEVELOP, AND EVALUATE RADIOISOTOPES FOR TELETHERAPY. Progress rept. on Contract AT(40-1)1771. 15 July 55, 59p.

TID-17169 $3.60

Arkansas U. [Medical Center] Little Rock.
TO INVESTIGATE, DEVELOP, AND EVALUATE RADIOISOTOPES FOR TELETHERAPY. Progress rept. on Contract AT(40-1)1771. 23 July 56, 32p.

TID-17171 $1.60

Arkansas U. [Medical Center] Little Rock.
TO INVESTIGATE, DEVELOP, AND EVALUATE RADIOISOTOPES FOR TELETHERAPY. Progress rept. on Contract AT(40-1)1771. 1 July 57, 19p.

TID-17170 $2.60

Arkansas U. [Medical Center] Little Rock.
TO INVESTIGATE, DEVELOP, AND EVALUATE RADIOISOTOPES FOR TELETHERAPY. Progress rept. on Contract AT(40-1)1771. 1 July 58, 24p.

BNL-6339 $1.10

Brookhaven National Lab., Upton, N. Y.
KINETICS OF ERYTHROBLASTIC CELL POPULATIONS IN THE DOG, STUDIED WITH TRITIATED THYMIDINE, by N. Odartchenko, V. P. Bond and others. 9 Nov 62, 10p. 6 refs.

HW-SA-2700 $3.60

Hanford Atomic Products Operation, Richland, Wash.
DISTRIBUTION AND REMOVAL OF TRANSURANIC ELEMENTS AND CERIUM DEPOSITED BY THE INHALATION ROUTE, by W. J. Bair, E. G. Tombropoulos, and J. F. Park. Rept. on Contract AT(45-1)1350. [1962] 32p. 23 refs.

LADC-5446 $4.60

Los Alamos Scientific Lab., N. Mex.
DETERMINATION OF BODY POTASSIUM BY 4 π GAMMA COUNTING, by Ernest C. Anderson. Rept. on Contract W7405-eng-36. [1962] 44p. 31 refs.

LADC-5427 $1.60

Los Alamos Scientific Lab., N. Mex.
NEW METHODS OF NEUTRON DOSE RATE EVALUATION, by Dale E. Hankins. Rept. on Contract W7405-eng-36. [1962] 14p. 20 refs.

UR-618 $10.10

Rochester U. School of Medicine and Dentistry, N.Y.
INACTIVATION OF BACTERIOPHAGE T6 IN AN ACQUEOUS SYSTEM BY HIGH-ENERGY PROTONS, by Hiroshi Tanooka. Rept. on Contract W7401-eng-49. 7 Sep 62, 121p. 89 refs.

TID-17000 $1.60

Texas U., Houston.
THE EFFECTS OF RADIATION ON THE GENETIC SYSTEM OF ORGANISMS IN RELATION TO THEIR PHYSIOLOGICAL AND BIOCHEMICAL SYSTEMS, by Mary L. Alexander. Progress rept. 1 May 57-30 Apr 58, on Contract AT(40-1)1828. 30 Oct 62, 16p. 15 refs.

TID-17001 $2.60

Texas U., Houston.
THE EFFECTS OF RADIATIONS ON THE GENETIC SYSTEMS OF ORGANISMS IN RELATION TO THEIR PHYSIOLOGICAL AND BIOCHEMICAL SYSTEMS, by Mary L. Alexander. Progress rept. 1 May 58-30 Apr 59, on Contract AT(40-1)1828. 30 Oct 62, 24p. 19 refs.

TID-17002 $1.60

Texas U., Houston.
THE EFFECTS OF RADIATIONS ON THE GENETIC SYSTEMS OF ORGANISMS IN RELATION TO THEIR PHYSIOLOGICAL AND BIOCHEMICAL SYSTEMS, by Mary L. Alexander. Progress rept. 1 May 59-30 Apr 60, on Contract AT(40-1)1828. 30 Oct 62, 20p. 23 refs.

TID-17003 $1.60

Texas U., Houston.
THE EFFECTS OF RADIATIONS ON THE GENETIC SYSTEMS OF ORGANISMS IN RELATION TO THEIR PHYSIOLOGICAL AND BIOCHEMICAL SYSTEMS, by Mary L. Alexander. Progress rept. 1 May 60-30 Apr 61, on Contract AT(40-1)1828. 30 Oct 62, 15p. 15 refs.

CHEMISTRY

IS-500 $4.00

Ames Lab., Iowa State U. of Science and Tech.
CHEMISTRY, ENGINEERING, METALLURGY AND PHYSICS. Annual summary research rept. 1 July 61-30 June 62, on Contract W-7405-eng-82. Sep 62, 337p. 157 refs.

TID-14891 $3.60

Argonne National Lab., Ill.
SYNERGISM IN THE SOLVENT EXTRACTION OF CI, TRI AND TETRAVALENT METAL IONS. PART III. ANTISYNERGISM WITH THENOYL TRIFLUORACETONE, by T. V. Healy and G. W. Mason. Rept. on Contract W31-109-eng-38. Nov 61, 32p. 10 refs. UAC-5880.

HW-SA-2319 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE RINGOLD FORMATION AND ITS RELATIONSHIPS TO OTHER FORMATIONS, by Randall E. Brown and Donald J. Brown. Rept. on Contract AT(45-1)1350. Nov 61, 18p. 14 refs.

UCRL-9705 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
CRYSTAL STRUCTURE OF PROPIONIC ACID, by Frederick J. Strieter and David H. Templeton. Rept. on Contract W7405-eng-48. 23 May 61, 14p. 19 refs.

Analytical Chemistry

TID-14065 $1.10

Argonne National Lab., Ill.
A QUANTITATIVE METHOD FOR THE DETERMINATION OF THE OXIDATIVE STRENGTH OF OSMIUM TETROXIDE IN FIXATIVES, by Norman A. Frigerio and B. R. Nebel. Rept. on Contract W31-109-eng-38. July 61, 9p. 1 ref. UAC-5515.

BNL-5521 $1.60

Brookhaven National Lab., Upton, N. Y.
THE MICRODETERMINATION OF CARBON IN URANIUM METAL AND URANIUM CARBIDE, by S. J. Tassinari. 19 July 61, 14p. 5 refs.

UCRL-9887 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
THE SPECTROPHOTOMETRY OF METAL-AMMONIA SOLUTIONS AT LOW TEMPERATURES, by Marvin Gold and William L. Jolly. Rept. on Contract W7405-eng-48. Dec 61, 11p.

NLCO-859 $0.50

National Lead Co. of Ohio, Cincinnati.
DETERMINATION OF LATTICE CONSTANTS OF POLYCRYSTALLINE (MONOCLINIC) URANIUM TETRAFLUORIDE, by Peter R. Morris and Vernon Morton. Rept. on Contract AT(30-1)-1156. 3 Dec 62, 19p. 15 refs.

TID-17030 $2.60

National Lead Co. of Ohio, Cincinnati.
THE SPECTROCHEMICAL DETERMINATION OF MOLYBDENUM AND VANADIUM IN URANIUM TETRAFLUORIDE, by M. G. Atwell and H. A. Heller. Rept. on Contract AT(30-1)1156. 1 Sep 62, 24p. 3 refs.

IDO-14591 $0.50

Phillips Petroleum Co., Idaho Falls.
SILVER SPARK SPECTROGRAPHIC ANALYSIS OF HIGH PURITY WATER, by G. W. Dickinson and G. V. Wheeler. Rept. on Contract AT(10-1)-205. 20 July 62, 10p. 3 refs.

DP-766 $0.50

Savannah River Lab., Aiken, S. C.
DETERMINATION OF TRACES OF WATER IN FUSED UO_2, by Philippe J. P. Chastagner. Rept. on Contract AT(07-2)-1. Sep 62, 12p. 8 refs.

DP-750 $0.50

Savannah River Lab., Aiken, S. C.
THE POLYMORPHS OF UO_3: CONVERSION TO UF_4, by Wilmer R. Cornman, Jr. Rept. on Contract AT(07-2)-1. Aug 62, 12p. 9 refs.

DP-749 $0.50

Savannah River Lab., Aiken, S. C.
PREPARATION AND CHARACTERIZATION OF THE POLYMORPHS OF UO_3, by Wilmer R. Cornman, Jr. Rept. on Contract AT(07-2)-1. Aug 62, 12p. 9 refs.

Inorganic Chemistry

GAT-T-970 $1.10

Goodyear Atomic Corp., Portsmouth, Ohio.
HEXAFLUORIDES OF MOLYBDENUM, TUNGSTEN AND URANIUM. II. REACTIONS WITH LIQUID AND GASEOUS DINITROGEN TETROXIDE, by J. R. Geichman, E. A. Smith and others. Rept. on Contract AT(33-2)1. 29 Jan 62, 9p. 9 refs.

HW-SA-2755 $1.60

Hanford Atomic Products Operation, Richland, Wash.
SYNTHESIS AND PROPERTIES OF PLUTONIUM MONONITRIDE, by D. F. Carroll. Rept. on Contract AT(45-1)1350. 17 Aug 62, 16p. 7 refs.

UCRL-9699 $1.10

Lawrence Radiation Lab., U. of California, Berkeley.
CARRIER-FREE SEPARATION OF HAFNIUM FROM RARE-EARTH OXIDES, by Mab I. Tocher and Jack M. Hollander. Rept. on Contract W7405-eng-48. May 61, 5p. 1 ref.

Physical Chemistry

TID-14906 $1.10

Argonne National Lab., Ill.
THE DIRECT DISSOLUTION OF METALS IN MOLTEN SALT SYSTEMS, by Donald Cohen. Rept. on Contract W31-109-eng-38. Dec 61, 2p. 1 ref. UAC-5905.

TID-14168 $4.60

Argonne National Lab., Ill.
SOME FUNDAMENTAL ASPECTS OF VAPORIZATION: VAPORIZATION COEFFICIENTS, by R. J. Ackermann, R. J. Thorn, and G. H. Winslow. Rept. on Contract W31-109-eng-38. Aug 61, 44p. 20 refs. UAC-5596.

BNL-5574 $1.10

Brookhaven National Lab., Upton, N. Y.
POSSIBLE CORRELATIONS BETWEEN THERMOELECTRIC POTENTIALS AND LIQUID METAL CORROSION, by John R. Weeks. [1962] 6p. 1 ref.

TID-17033 $2.60

Case Inst. of Tech., Cleveland, Ohio.
COPRECIPITATION WITH URANOUS OXALATE, by Jacob Block and Louis Gordon. [1961] 30p. 10 refs.

TID-14031 $2.60

Laboratory for Nuclear Science, Mass. Inst. of Tech. Cambridge.
DIFFERENTIAL THERMAL ANALYSIS OF ORGANIC COMPOUNDS. II. EFFECTS OF DILUTING AGENTS, by Edward M. Barroll II and L. B. Rogers. 25 Oct 61, 30p. 14 refs.

NASA N63-11742 $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
NITROGEN AND OXYGEN ATOM RECOMBINATION AT OXIDE SURFACES AND EFFECT OF A TESLA DISCHARGE ON RECOMBINATION HEAT TRANSFER, by George M. Prok. Jan 63, 19p. 27 refs. Technical note D-1567.

LAMS-2762 $0.75

Los Alamos Scientific Lab., N. Mex.
DIGITAL PROGRAMS FOR PARA HYDROGEN PROPERTIES, by O. A. Farmer. Rept. on Contract W-7405-eng-36. 14 Sep 62, 32p. 6 refs.
NASA N63-10864.

LADC-5449(Rev.) $1.10

Los Alamos Scientific Lab., N. Mex.
ON THE STRUCTURE OF A DETONATION WAVE IN THE LIMIT OF VANISHING PRANDTL AND LEWIS NUMBERS, by W. W. Wood. Rept. on Contract W7405-eng-36. [1961] 6p. 10 refs.

LADC-4369(rev. 2) $2.60

Los Alamos Scientific Lab., N. Mex.
SEPARATION OF THE LANTHANONS AT AMALGAM CATHODES V: A KINETIC STUDY OF LUTETIUM ENRICHMENT IN METHANOL ELECTROLYTES, by E. I. Onstott. Rept. on Contract W7405-eng-36. [1962] 28p. 13 refs.

ORNL-3293 $8.60

Oak Ridge National Lab., Tenn.
THERMODYNAMIC PROPERTIES OF MOLTEN-SALT SOLUTIONS, by Milton Blander. Rept. on Contract W7405-eng-26. 31 Oct 62, 98p. 133 refs.

TID-17192 $1.10

Rensselaer Polytechnic Inst., Troy, N. Y.
THERMODYNAMICS AND CONDUCTANCE OF SIMPLE ELECTROLYTES IN POLAR ORGANIC SOLVENTS, by George J. Janz. Progress rept. no. 6 on Contract AT(30-1)1999. Oct 62, 8p. 9 refs.

TID-16592 $1.60

Stanford Research Inst., Menlo Park, Calif.
SORPTION OF GASES ON METAL SURFACES IN ULTRAHIGH VACUUM. Quarterly progress rept. no.2, 15 May-15 Aug 62, on Contract AT(04-3)425. 6 Sep 62, 14p. 6 refs. SRI Proj. PAU-3994.

NYO-9803 $1.10

Westinghouse Electric Corp., Pittsburgh, Pa.
EVIDENCE FOR AN AUGER PROCESS IN CHEMISORPTION, by P. M. Waters. 25 July 61, 9p. 11 refs. Scientific paper 808-D801-P1.

TID-13814 $1.10

Worcester Polytechnic Inst., Mass.
ELECTROCHEMICAL POTENTIALS OF IONS, by Joseph E. Boggio and Robert C. Plumb. 19 Oct 61, 8p. 13 refs.

EARTH SCIENCES

PB 162 732 $7.60

Aeronautical Chart and Information Center, St. Louis, Mo.
DETERMINATION OF GROUND POSITIONS FROM OBSERVATIONS OF ARTIFICIAL EARTH SATELLITES. Oct 59, 74p. 15 refs. ACIC Technical rept. no. 86.

DESCRIPTORS: *Satellite vehicles, Orbital flight paths, Tracking, Orbital trajectories, Celestial mechanics, Ground-position indicators, *Position finding, *Geodetic data, *Geodetic astronomy, Photographic analysis.

The purpose of this study was to devise workable procedure for determining the geodetic position of an observation site from orbital data and photographic plates of artifical satellites. Development of procedure depended heavily on published information from the Smithsonian Institute, Space Track, and the U. S. Naval Observatory. Along with Space Track bulletins, two or more good photographic plates of a satellite are needed for a solution. The time lapse between plates should be at a minimum. This recommendation stems from a conclusion that satellites now in orbit are not entirely satisfactory for geodetic purposes because their orbital elements are changing too much from day to day. (Author)

TID-16973 $5.60

General Mills, Inc., Minneapolis, Minn.
INVESTIGATION OF AN AIR EJECTOR PUMP FOR HIGH ALTITUDE SAMPLING SYSTEMS, by A. R. McFarland. 15 May 62, 60p. 7 refs. Rept. no. 2277.

Geology

BNL-5628 $1.60

Brookhaven National Lab., Upton, N. Y.
DETERMINATION OF LEAD IN METEORITES BY ALPHA ACTIVATION ANALYSIS, by James C. Cobb. [1961] 14p. 16 refs.

BNL-6000 $1.60

Brookhaven National Lab., Upton, N. Y.
INVESTIGATIONS OF THE POTASSIUM-ARGON METHOD OF AGE DETERMINATION USING SOLID ISOTOPIC DILUTION AND GAS REMOVAL BY CRUSHING, by John J. Naughton. 23 Apr 62, 12p. 8 refs.

BNL-5554 $1.60

Brookhaven National Lab., Upton, N. Y.
POTASSIUM-ARGON AGES OF VOLCANICS NEAR GRANTS, NEW MEXICO, by W. A. Bassett, P. F. Kerr and others. 23 Aug 61, 19p. 3 refs.

HW-SA-2175 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE USE OF CLINOPTILOLITE TO REMOVE POTASSIUM SELECTIVELY FROM AQUEOUS SOLUTIONS OF MIXED SALTS, by L. L. Ames, Jr. and B. W. Mercer. Rept. on Contract AT(45-1)1350. 16 May 61, 6p. 3 refs.

HW-SA-2169 $1.60

Hanford Atomic Products Operation, Richland, Wash.
VOLUME RELATIONSHIPS DURING REPLACEMENT REACTIONS, by L. L. Ames, Jr. Rept. on Contract AT(45-1)1350. 24 Apr 61, 13p. 12 refs.

LAMS-2760 $1.60

Los Alamos Scientific Lab., N. Mex.
EQUATION OF STATE OF NEVADA ALLUVIUM, by R. G. McQueen and S. P. Marsh. Rept. on Contract W7405-eng-36. Nov 61, 13p.

UCRL-13004 $2.60

Stanford Research Inst., Menlo Park, Calif.
EQUATIONS OF STATE OF GRANITE AND SALT, by D. R. Grine. Final rept. on Subcontract 122. 15 May 61, 24p. 15 refs. SRI Proj. PGD-3244.

Oceanography

NYO-10470 $13.50

Bermuda Biological Station, St. George's West.
THE BIOCHEMICAL CIRCULATION OF ELEMENTS IN THE SARGASSO SEA, by John H. Ryther and David W. Menzel. Appendices to progress rept. 1 Sep 61-31 Aug 62. Rept. on Contract AT(30-1)2646. 1 Sep 62, 200p. 87 refs.

TID-17342 $9.60

Chesapeake Bay Inst., Johns Hopkins U., Annapolis, Md.
A REVIEW OF THEORETICAL MODELS OF TURBULENT DIFFUSION IN THE SEA, by Akira Okubo. Technical rept. no. 30 on Contract AT(30-1)1477. Sep 62, 113p. 94 refs. NYO-8101; Ref. 62-20.

ENGINEERING

PB 162 625 $3.60

Eastern Air Devices, Inc., Dover, N. H.
DEVELOPMENT OF TWO HIGH TEMPERATURE BLOWER UNITS, by H. Alexandre. Interim development rept. no. 4, 2 Dec 59-2 Mar 60, on Contract NObsr-77537. [1960] 40p.; AD-248 626.

DESCRIPTORS: *Blowers, Cooling, Bearings, *Cooling fans, *Electronic equipment, Electric motors.

Performance tests have been run on the prototype version of the Phase I blower developed under this program for development of two high temperature blowers capable of continuous operation in an ambient temperature of 200 C. This unit, originally designed to deliver 75 CFM at 1.5 inches static pressure, delivers 90 CFM at 1.5 inches static pressure. The blower efficiency is 48%, 13% above the anticipated value. Temperature rise of the blower motor combination using a 1-5/8 in. diameter 30 frame motor is 21 C at 1.5 inches static pressure. Tests of a larger 2-1/4 in. diameter motor specifically designed for this application in order to provide maximum motor efficiency and more effective motor cooling show an improvement in motor efficiency and more effective motor cooling show an improvement in motor efficiency of 85%. This increased motor efficiency plus the better cooling is expected to reduce the temperature rise of the blower motor combination to approximately 15 C. This improved performance means added high temperature life. Bearing life tests at 200 C have been run on three bearing test motors. These units completed 279, 417 and 144 hours, respectively, before failure. Test results show the bearing retainer to be the limiting factor. (Author)

PB 162 702 $26.00

Joint Military Packaging Training Center, Rossford Ordnance Depot, Toledo, Ohio.
COURSE OUTLINE FOR 400-L-F-5 (I) PRESERVATION AND INTERMEDIATE PROTECTION. July 62, 517p. 280 refs. Supersedes course outline dated Jan 60, PB 181 085.

DESCRIPTORS: *Containers, *Packaging, Military requirements, *Cargo, Loading, Handbooks.

Contents:
Introduction to preservation and intermediate protection
General departmental packaging policies
Packaging specifications
Cleaning
Preservatives and their application
Methods of preservation
Packaging requirements code
Packaging cost
(Engineering, 5 Apr 63)

PB 162 680 $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
DESIGN OF A WELDED STEEL SHIELDED ROOM, by A. M. Intrator. 15 Sep 51, 21p. 6 refs. Technical memo. M-046.

DESCRIPTORS: *Shielding, *Electromagnetic shielding, Structures, *Steel, Design, Construction.

Shielded rooms often are used to provide working areas free of spurious electromagnetic energy where such energy would interfere with the proper operation of equipment or with measurements being made. Many high-quality shielded rooms are built of copper sheet. In order to investigate more economical avenues of construction, other metals have been considered. Theoretical investigations indicated that promising results could be obtained with steel, and an all welded sheet-steel room has been designed. The room is expected to perform as well as a comparable copper one and will be more economical to build. (Author)

AD-270 241 $9.60

Structural Mechanics Research Lab., U. of Texas, Austin.
DESIGN OF CUSHIONING SYSTEMS FOR AIR DELIVERY OF EQUIPMENT, by Billy C. Ellis, E. A. Ripperger, and Neils Thompson. Rept. on Contract DA 19-129-qm-1383. Aug 61, 114p. 20 refs.

DESCRIPTORS: Air transportation, *Air drop operations, *Military equipment, Vehicles, Cargo vehicles, Cargo, Protective coverings, *Landing impact, Landing, Stresses, Impact shock, Theory, Mathematical analysis, Mathematical prediction, Military requirements, Materials, *Plastics, Expanded plastics, Honeycomb cores.

The air delivery of equipment to combat troops has become commonplace in military tactical operations. The purpose of this report is to describe effective systems by which the impact on ground contact may be reduced within permissible limits through the use of cushioning materials. In addition to theory of cushioning, the properties of cushioning materials, and the fragility of vehicles, this report describes the procedure for designing a cushioning system for a vehicle. (Author)

Chemical Engineering

NAA-SR-6405 $0.50

Atomics International, Canoga Park, Calif.
LIQUID LITHIUM EXTRACTION OF THORIUM FROM THORIUM-MAGNESIUM ALLOY, by L. A. Hanson. Rept. on Contract AT(11-1)-GEN-8. 15 Oct 62, 16p. 8 refs.

HW-SA-2787 $2.60

Hanford Atomic Products Operation, Richland, Wash.
FORCES IN A MOVING BED OF PARTICULATE SOLIDS WITH INTERSTITIAL FLUID FLOW, by Herman L. Brandt and Benjamin M. Johnson. Rept. on Contract AT(45-1)1350. 9 Oct 62, 27p. 8 refs.

UCRL-9787 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
DISPERSED-PHASE DISTRIBUTION PATTERNS IN LIQUID-LIQUID AGITATION, by Lawrence H. Weiss, J. Leonard Fick and others. Rept. on Contract W-7405-eng-48. 6 Sep 62, 92p. 29 refs.

IDO-14593 $1.00

Phillips Petroleum Co., Idaho Falls.
CHEMICAL PROCESSING TECHNOLOGY, ed. by J. R. Bower. Quarterly progress rept. Apr-June 62, on Contract AT(10-1)-205. 24 Sep 62, 43p. 7 refs.

IDO-14569 $1.50

Phillips Petroleum Co., Idaho Falls.
PILOT PLANT DEVELOPMENT STUDIES OF A CONTINUOUS PROCESS FOR RECOVERING URANIUM FROM NICHROME FUELS, by H. V. Chamberlain. Rept. on Contract AT(10-1)-205. 20 June 62, 64p. 12 refs.

DP-370 $0.50

Savannah River Lab., Aiken, S. C.
HYDRAULIC PERFORMANCE OF A 5-INCH CENTRIFUGAL CONTACTOR, by Donald S. Webster, Clifton L. Williamson, and James F. Ward. Rept. on Contract AT(07-2)-1. Aug 62, 14p. 1 ref.

PB 162 675 $9.10

Armour Research Foundation, Chicago, Ill.
INSTRUMENTATION AND MEASUREMENT TECHNIQUES STUDY, by A. C. Todd. Quarterly progress rept. no. 4, 1 Nov 59-31 Jan 60, on Contract DA 36-039-sc-78269. [1960] 107p. 9 refs. ARF-5112.12.

DESCRIPTORS: *Instrumentation, *Measuring devices (Electrical and electronic), *Modulators, Sidebands, Variable capacitors, Generators, *Semiconductor devices, *Hall effect, *Wattmeters, Audiofrequency, *Parametric amplifiers, *Attenuators, Magnetostriction, Electric fields, Detection, Diodes, Ferroelectricity, Piezoelectric effect.

The program involves a study aimed at advancement of the state of the art of electrical measurements. Efforts during this period have been devoted to a study of the use of voltage-variable capacitors in a single-sideband generator and in a low-pass-filter parametric amplifier; to a consideration of the application of an improved Hall device in a single-sideband generator, a balanced modulator, a phase modulator, a cascade phase modulator, a direct frequency modulator, and an audio-frequency wattmeter; to an investigation of the employment of the magnetoresistive effect in a multi-element stripline attenuator; and to a study of field effect, depletion effect, ferroelectric effect and piezoelectric effect for possible use as electric field sensors. (Author)

PB 162 676 $8.60

Armour Research Foundation, Chicago, Ill.
INSTRUMENTATION AND MEASUREMENT TECHNIQUES STUDY, by A. C. Todd. Quarterly progress rept. no. 5, 1 Feb-30 Apr 60, on Contract DA 36-039-sc-78269. [1960] 94p. 7 refs. ARF-5112-15.

DESCRIPTORS: *Instrumentation, *Measuring devices (Electrical and electronic), *Parametric amplifiers, Transmission lines, Variable capacitors, *Wattmeters, Audiofrequency, X band, *Hall effect, Frequency, Control systems, *Digital systems, Oscillators, *Semiconductor devices.

Efforts during this period have been devoted to an experimental study of a twenty-stage lumped-element parametric amplifier; to an analysis of a parametric amplifier formed by a transmission line periodically loaded with voltage-variable capacitors; to the design, construction and testing of an audio-frequency wattmeter employing the Hall-effect; to the modification and testing of X-band wattmeters employing the Hall-effect; and to a consideration of a possible system for the digital control of frequency. (Author) (See also PB 162 675)

PB 162 677 $6.60

Armour Research Foundation, Chicago, Ill.
INSTRUMENTATION AND MEASUREMENT TECHNIQUES STUDY, by A. C. Todd. Quarterly progress rept. no. 6, 1 May-31 July 60, on Contract DA 36-039-sc-78269. [1960] 63p. 11 refs. ARF 5112-18.

DESCRIPTORS: *Instrumentation, *Measuring devices (Electrical and electronic), *Parametric amplifiers, *Traveling wave tubes, Diodes, *Modulation, Distortion Measurement, Meters, *Hall effect, *Semiconductor devices, Modulators, Amplifiers, *Cerenkov radiation, Microwaves.

Efforts during this period have been devoted to an experimental study of a traveling wave parametric amplifier; to the design of an intermodulation distortion measurement meter based on the Hall effect; and to a study of transition radiation and Cerenkov radiation. (Author) (See also PB 162 676)

TID-17254 $3.60

Atomics International, Canoga Park, Calif.
PERFORMANCE OF CESIUM THERMIONIC DIODES OPERATED IN SERIES-PARALLEL CIRCUITS, by J. W. Holland. American Rocket Society, Space Power Systems Conference, held Sep 25-28, 1962, at Miramar Hotel, Santa Monica, Calif. Rept. on Contract AT(11-1)GEN-8. [1962] 32p.

NAA-SR-7036 $0.50

Atomics International, Canoga Park, Calif.
PROCESS DEVELOPMENT AND FABRICATION OF PbTe THERMOELECTRIC ELEMENTS, by F. R. Bennett and K. Langrod. Rept. on Contract AT(11-1)-GEN-8. 30 Oct 62, 24p. 2 refs. NASA N62-17555.

AD-267 068 $4.60

Bell Telephone Labs., Inc., Murray Hill, N. J.
ENGINEERING SERVICES ON TRANSISTORS, by M. M. Atalla, R. C. Beairsto and others. Quarterly progress rept. no. 1 (Rept. no. 5), 4 Mar-3 June 61, on Contract DA 36-039-sc-88962; continuation of Contract DA 36-039-sc-84352. 3 Aug 61, 41p. 10 refs.

DESCRIPTORS: *Transistors, Reliability, Reliability (Electronics), Aging, Failure (Mechanics), Tests, Silicon, *Diodes, Germanium, *Transistor amplifiers, Electrical properties, Measurement, Switching circuits, *Electronic circuits, Microwave equipment, Encapsulation, Design.

This report covers, (1) results of high stress aging experiments on the 2N560 diffused silicon transistor, (2) status of development work on a 1 watt, 1000 mcps germanium transistor, (3) status of integrated circuit development including development of standardized modules of single and multiple diodes and transistors, the development of a single-junction P N shifter diode for use in an LLL gate circuit with some experimental data on switching speeds of the LLL gate circuit and (4) an experimental study of the wellknown alpha falloff at low currents in silicon transistors by means of a guard ring emitter which indicates that virtually all of the base current (at low currents) originates at the surface edge of the emitter. (Author)

AD-271 380 $6.60

Bell Telephone Labs., Inc., Murray Hill, N. J.
ENGINEERING SERVICES ON TRANSISTORS, by M. J. Birck, R. E. Davis and others. Quarterly progress rept. no. 1 (Rept. no. 6), 4 June-30 Sep 61, on Contract DA 36-039-sc-88931; continuation of Contract DA 36-039-sc-88962. 31 Dec 61, 67p. 9 refs.

DESCRIPTORS: *Transistors, *Diodes, Semiconductors, Germanium, Reliability, Encapsulation, Aging, Water vapor, High temperature research, Electronic circuits, Design, Microwaves, Ultrahigh frequency, Films, Silicon compounds, Monoxides, Gold.

This report covers, (1) results on effects of water vapor on thermal aging of multiple diodes, (2) status of development work on a 1 watt, 1000 mc germanium transistor, describing an improved structure, a study of unilateral gain as a figure of merit, and analysis of an equivalent circuit, and (3) a status report on integrated circuit investigation which covers studies of optimum arrangement of semiconductor devices which should be in a common encapsulation to obtain optimum layout of a larger system block and study of switching speed of the low-level logic gate as a function of fan-out and drive. (Author) (See also AD-267 068)

PB 162 637 $1.10

Cannon Electric Co., Los Angeles, Calif.
CONNECTOR, SPECIAL MISSILE, MINIATURE, MULTI-CONTACT. Interim development rept. 23 June-30 Sep 58, on Contract NObsr-72798. 21 Dec 58, 8p.

DESCRIPTORS: *Rocket components, *Miniature electrical equipment, *Electric connectors, Plugs (Electricity), Couplings, Electric insulation, Design, Materials, Tests.

The purpose of this program is the development of a minimum size series of connectors to withstand the test conditions enumerated in contract specification SHIPS-C-2817.

PB 162 636 $1.10

Cannon Electric Co., Los Angeles, Calif.
CONNECTOR, SPECIAL MISSILE, MINIATURE, MULTI-CONTACT. Interim development rept. 1 Oct-31 Dec 58, on Contract NObsr-72798. 20 Jan 59, 8p.

DESCRIPTORS: *Rocket components, *Miniature electrical equipment, *Electric connectors, Plugs (Electricity), Couplings, Electric insulation, Design, Heat-resistant materials, Tests.

A test was performed to determine the dielectric strength of Dow Corning XM4096M material when subjected to prolonged exposure at temperatures up to 1000° F, and also to determine the environmental compatibility of this insulator material with Silver-Magnesium-Nickel alloy contacts and B1113 mild steel hardware. A laboratory test was performed on an MSK-24-28S plug fitted with an XM4096M material insulator. A layout was made of a 10 contact insulator using #16 contacts. Design layouts and drawings were made for a 10 contact experimental connector. Molds for the 10 contact insulators were made and parts molded, using modifications of the XM4096M material. These were subjected to heat resistance tests by Cannon laboratories and by Dow Corning, the material originators. Plug and receptacle shells and a coupling device were manufactured. (See also PB 162 637)

PB 162 638 $1.10

Cannon Electric Co., Los Angeles, Calif.
CONNECTOR, SPECIAL MISSILE, MINIATURE, MULTI-CONTACT. Interim development rept. 1 Jan-31 Mar 59, on Contract NObsr-72798. 15 Apr 59, 7p.

DESCRIPTORS: *Rocket components, *Miniature electrical equipment, *Electric connectors, Plugs (Electricity), Couplings, Electric insulation, Design, Heat-resistant materials, Vibration, Tests.

This report covers materials investigation, mechanical design and tests leading to the producing of preliminary drawings of a 10 and a 12 contact connector. (Author) (See also PB 162 636)

PB 162 639 $1.60

Cannon Electric Co., Los Angeles, Calif.
CONNECTOR, SPECIAL MISSILE, MINIATURE, MULTI-CONTACT. Interim development rept. 19 May-19 Aug 59, on Contract NObsr-72798. 31 Aug 59, 19p.

DESCRIPTORS: *Rocket components, *Miniature electrical equipment, *Electric connectors, Plugs (Electricity), Couplings, Electric insulation, Design, Heat-resistant materials, Vibration, Tests, Production.

This report covers materials investigation, vibration testing, production simplification and the initiation of production procedures for the six connector sizes to be furnished. (See also PB 162 638)

PB 162 640 $1.60

Cannon Electric Co., Los Angeles, Calif.
CONNECTORS, SPECIAL MISSILE, MINIATURE, MULTI-CONTACT. Interim development rept. 19 Aug-19 Nov 59, on Contract NObsr-72798. 25 Nov 59, 16p.

DESCRIPTORS: *Rocket components, *Miniature electrical equipment, *Electric connectors, Plugs (Electricity), Couplings, Electric insulation, Design, Heat-resistant materials, Finishes, Lubricants, Tests, Production.

This report covers selection of insulator material, preliminary evaluation of tool-made sample hardware, redesign of contacts for snap-in type location, and investigation of high temperature lubricants and finishes. (Author) (See also PB 162 639)

PB 162 641 $1.60

Cannon Electric Co., Los Angeles, Calif.
CONNECTOR, SPECIAL MISSILE, MINIATURE, MULTI-CONTACT. Interim development rept. 19 Nov 59-15 Feb 60, on Contract NObsr-72798. 29 Feb 60, 16p.

DESCRIPTORS: Rocket components, *Miniature electrical equipment, *Electric connectors, Plugs (Electricity), Couplings, Electric insulation, Design, Heat-resistant materials, Finishes, Lubricants, Vibration, Tests, Production.

This report covers selection of a high temperature resistant finish for the connector shells, production of parts for 10 connectors in the 10 #16 contact size, redesign and drawing of the remaining shell and insert sizes, and the start of tooling these connectors. (Author) (See also PB 162 640)
(Engineering--Electrical, 5 Apr 63)

PB 162 693 $2.60

Clevite Corp., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ULTRA-HIGH-TEMPERATURE DIELECTRIC MATERIALS FOR CAPACITORS, by John Koenig. Quarterly rept. no. 1, 1 May-31 July 58, on Contract NObs-72404. 29 Aug 58, 21p. 4 refs.

DESCRIPTORS: *Ceramic capacitors, *Dielectrics, Ceramic materials, *Niobium compounds, *Lanthanum compounds, Oxides, Preparation, Density, Electrostatic capacitance, Resistance, X-ray diffraction analysis, High temperature research.

High density ceramic discs consisting of Nb_2O_5 and of Nb_2O_5 containing 1, 3, and 10 mole percent La_2O_3 additions were prepared. Analysis by X-ray diffraction indicates that the two oxides formed a compound which dispersed but did not dissolve in the Nb_2O_5 excess.

Volume resistivity of the specimens was found to rise at 50°C. with increasing La content from about 10^6 ohm-m for Nb_2O_5 to 3 x 10^9 ohm-m for 90 Nb_2O_5 + 10 La_2O_3. The values drop sharply with increasing temperature to between 4 x 10^3 and 8 x 10^3 ohm-m at 400°C. Dielectric constant and Q values measured at 1 Mc diminish with increasing La content, K from about 170 to 70 and Q from 180 to 80 at 150°C. for Nb_2O_5 and 90 Nb_2O_5 + 10 La_2O_3 respectively. At about 400° the approximate corresponding values for K decrease from 135 to 90 and for Q from 12 to 6. (Author)

PB 162 694 $1.60

Clevite Corp., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ULTRA-HIGH-TEMPERATURE DIELECTRIC MATERIALS FOR CAPACITORS, by John Koenig. Quarterly rept no. 3, 1 Nov 58-31 Jan 59, on Contract NObs-72404. 23 Feb 59, 20p. 1 ref.

DESCRIPTORS: *Ceramic capacitors, *Dielectrics, Ceramic materials, *Barium compounds, Zirconates, *Lanthanum compounds, Aluminates, Niobium compounds, Silicon compounds, Titanium compounds, Oxides, Density, Dielectric properties, Resistance, X-ray diffraction analysis, High temperature research.

Ceramic discs of various materials were prepared. Among these the compound $BaZrO_3$ modified with La_2O_3 and Nb_2O_5 and the compound $LaAlO_3$ modified with SiO_2 have attractive high temperature dielectric properties. At 350°C dielectric constant, quality factor and volume resistivity were as follows:

	K	Q	$\rho(\Omega\text{-m})$
$(Ba_{.91}La_{.06})ZrO_3$	35	100	$5x10^9$
$Ba_{.98}(Zr_{.96}Nb_{.04})O_3$	20	500	10^9
$La(Al_{.96}Si_{.03})O_3$	23	300	$6x10^8$
$(LaAlO_3)_{.99}(SiO_2)_{.01}$	24	300	10^8

The change of dielectric constant in the range from room temperature to 500° was less than 10%. (Author) (See also PB 154 541)

PB 162 695 $4.60

Clevite Corp., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ULTRA-HIGH-TEMPERATURE DIELECTRIC MATERIALS FOR CAPACITORS, by John Koenig. Final rept. 1 Feb 58-30 Apr 59, on Contract NObs-72404. 20 May 59, 47p. 8 refs.

DESCRIPTORS: *Ceramic capacitors, *Dielectrics, Ceramic materials, *Barium compounds, Zirconates, *Lanthanum compounds, Aluminates, Alkaline earth compounds, Tantalates, Zirconium compounds, Titanates, Aluminum compounds, Niobates, Preparation, Density, Dielectric properties, Resistance, X-ray diffraction analysis, High temperature research.

A variety of ceramic materials were produced. Several of these were modified by small amounts of substitutional oxide additives. Preliminary screening of these compounds was carried out by measurements of dielectric constant and quality factor at 1 Mc and resistivity at 100 V d.c. in the range from 23° to 500°C. By these tests members from three groups - the $BaZrO_3$, $LaAlO_3$, and $La_2Ti_2O_7$ group - were found eligible for further work. The room temperature dielectric constants ranged from 30 to 50, and changed by 12% or less up to 500°C. At 350°C, quality factors were about 500 and the electrical volume resistivities were over 10^8 ohm-meters. (Author) (See also PB 162 694)

PB 162 626 $5.60

[Electronics Research Lab.] U. of California, Berkeley.
ELECTRICALLY SMALL CAVITY ANTENNAS, by John T. Bolljahn. Rept. on Contract NObsr-39401. 26 Nov 48, 59p. 11 refs. USNER Lab. rept. no. 143.

DESCRIPTORS: Antennas, Antenna configurations, *Slot antennas, Loop antennas, Antenna radiation patterns, Diffraction, Electric fields, Magnetic fields, Cavity resonators.

Two basic types of antennas, having properties similar to those of a short probe and a small loop respectively, are considered. Geometrically, the two types are similar in that each employs a cylindrical cavity terminating in the ground plane. For loop operation, excitation is provided by a wire across the open cavity, and for probe operation the excitation wire is along the axis of the cylinder. Theoretical and experimental results are compared and presented in terms of the equivalent probe or loop size relative to the dimensions of the cavity.

PB 162 671 $6.60

Elgin National Watch Co., Ill.
RELAY FOR TRANSISTOR CIRCUITS, by William Juptner and Milton B. Sheffield. Final progress rept. on Contract DA 36-039-sc-72395. 14 Jan 58, 69p. 6 refs. AD-218 650.

DESCRIPTORS: *Electric relays, Relays, *Transistors, *Circuits, Polarized relays, Miniature electrical equipment.

A review of the technical requirements, technical literature, reports or papers, and presently available relays in the class was made. A preliminary analysis of the required relays was made. Basic designs of component parts for both polar and sensitive relays were studied, analyzed, produced, and tested. Preliminary samples were produced and tested. Thirteen (13) final samples of each relay type were produced and tested for the major objectives specified in the technical requirements. (Author)

TID-15459 $2.60

General Electric Co., Owensboro, Ky.
NEW DEVELOPMENTS IN ULTRA FAST WARM-UP PLANAR TUBES, by J. M. Connelly and D. D. Mickey. 23 Apr 62, 21p. 3 refs.

PB 162 669 $11.50

General Electric Co. [Schenectady, N. Y.]
ACCELERATED LIFE TESTING INVESTIGATION: CAPACITOR RELIABILITY STUDIES, by H. S. Endicott. Summary rept. on Contract AF 04(645)12. 1 Sep 59, 153p. 18 refs.

DESCRIPTORS: *Mica capacitors, *Ceramic capacitors, Capacitors, Life expectancy, *Reliability (Electronics), Quality control, Stresses, Electronic equipment.

A controlled experiment was run, using mica capacitors as representative electronic components, to test the hypothesis that progressive stress life test results are mathematically relatable to the results of steady stress tests, and to determine whether or not the progressive stress technique offers a useful means of accelerating life tests on electronic components. It was found that time-to-failure on progressive stress could be related to time-to-failure on steady stress. In addition the data indicate that a very short test is feasible for quality control or acceptance of mica capacitors. Time savings as great as a hundredfold over the usual steady stress procedure are possible. It was also found that the life of the mica capacitors was greatly affected by storage conditions and a short investigation of this effect was conducted. The encouraging results obtained suggest that the progressive stress technique offers considerable promise for accelerating life tests involving combinations of stresses and more complex components. (Author)

PB 162 630 $11.00

General Electric Co., Syracuse, N. Y.
SOLID STATE FILTERS, DELAY LINES AND TRANSFORMERS, by A. Rosengreen, C. M. Stearns, and S. W. Tehon. Quarterly rept. no. 1, 1 July-1 Oct 59, on Contract DA 36-039-sc-78346. [1959] 144p. 3 refs. AD-230 081.

DESCRIPTORS: *Delay lines, *Transformers, *Radio-frequency filters, Synthesis, Theory, Circuits, Ceramic materials, Materials, *Miniature electronic equipment.

A comprehensive review is presented of the state of the art in solid state filters. It begins with a survey of the synthesis methods which are available and then presents a concise review of image parameter theory which is the most useful technique for a research and development project of this nature. The common solid state filter elements are discussed, as well as the materials used in their fabrication. A detailed analysis of 2 cascaded ceramic transformers is presented along with experimental results. The results of an initial mode study for novel filter elements and material temperature stability tests are summarized. (Author)

PB 162 631 $8.60

General Electric Co., Syracuse, N. Y.
SOLID STATE FILTERS, DELAY LINES AND TRANSFORMERS, by A. Rosengreen, C. M. Stearns and others. Quarterly rept. no. 2, 1 Oct 59-1 Jan 60, on Contract DA 36-039-sc-78346. [1960] 95p. 3 refs. AD-234 507.

DESCRIPTORS: *Delay lines, *Transformers, *Radio-frequency filters, Mathematical analysis, Circuits, Ceramic materials, Impedance.

A mathematical analysis of the effects of the terminating impedances on the response of a single ceramic transformer is given. Both experimental and analytical results are presented to show the effects of the terminations on the filter bandwidth, center frequency and insertion loss. A theoretical curve showing the dissipation loss as a function of the 3db fractional bandwidth and the mechanical Q of the ceramic transformer is also included. The design of simple ceramic transformer filters incorporating inductances is presented. Typical response curves are shown which indicate the bandwidth widening which can be achieved by the use of inductances. The results of an investigation of the effects of electrode position on a transverse resonator are shown. These curves indicate that maximum bandwidth occurs when the electrodes are symmetrically located and cover approximately two-thirds of the resonator length. Consideration is given to ceramic transformer half lattice filters, torsional transformers, and a low loss wire sonic delay line. (Author) (See also PB 162 630)

PB 162 632 $8.60

General Electric Co., Syracuse, N. Y.
SOLID STATE FILTERS, DELAY LINES AND TRANSFORMERS, by A. Rosengreen, C. M. Stearns, and S. W. Tehon. Quarterly rept. no. 3, 1 Jan-1 Apr 60, on Contract DA 36-039-sc-78346. [1960] 91p. 1 refs. AD-240 888.

DESCRIPTORS: *Delay lines, *Transformers, *Radio-frequency filters, Magnetostriction, Ceramic materials, *Miniature electronic equipment, Circuits, Mathematical analysis, Band pass filters, Design.

A longitudinal mode magnetostrictive transformer is described and typical response curves are shown. A novel configuration which makes use of the mutual coupling between the driving coils and an additional capacitor to obtain an improved filter characteristic with points of infinite attenuation on both sides of the pass-band is also described. Ceramic bimorph reeds operating in the "free-free" flexural mode are described. Typical response curves for these low-frequency elements are presented along with curves indicating the increase in fractional bandwidth which can be expected with inductance tuning. The design of a 100:1 impedance transforming filter operating at 82 kilocycles and requiring all spurious responses to be 40 db below the main response for four octaves each side of the center frequency is given. The results of an investigation of the effects of electrode position on the bandwidth of an "end-plated" resonator are presented. (Author) (See also PB 162 631)

PB 162 633 $7.60

General Electric Co., Syracuse, N. Y.
SOLID STATE FILTERS, DELAY LINES AND TRANSFORMERS, by A. Rosengreen, C. M. Stearns, and S. W. Tehon. Quarterly rept. no. 4, 1 Apr-1 July 60, on Contract DA 36-039-sc-78346. [1960] 73p. 5 refs. AD-242 564.

DESCRIPTORS: *Delay lines, *Transformers, *Radio-frequency filters, *Synthesis, Theory, Magnetostrictive elements, Ceramic materials, Piezoelectric transducers, Barium compounds, Titanates.

Preliminary work on ceramic voltage transformers is described. In this initial phase the small signal parameters of various ceramic materials have been measured and high level linearity checks have been run on the more promising materials. A 360 kilocycle center frequency delay line has been constructed from a 91 mil diameter fused quartz rod and barium titanate transducers. The delay of this 23 inch line was 4.6 microseconds per inch and the bandwidth was 138 kilocycles. When the line was terminated with electrical matching sections the total insertion loss was 1.2 db and the sonic attenuation in the quartz was approximately .01 db. An investigation of the use of piezoresistive materials for active transducer applications is also described. The conclusion is that the magnitude of this effect is two or three orders too low to be of use in these applications. The investigation of torsional transducers has been continued and selective poling around the circumference of a ceramic tube produced a torsional transducer with a coupling coefficient of approximately 50%. Magnetostrictive filter work has also been continued. The cascading of these filters results in an improved shape factor and a moderate increase in midband insertion loss. The resonant freuqnecy of a ceramic reed flexural mode filter can be lowered by the addition of point masses but preliminary experiments indicate an appreciable increase in the insertion loss. (Author) (See also PB 162 632)

PB 162 634 $11.50

General Electric Co., Syracuse, N. Y.
SOLID STATE FILTERS, DELAY LINES AND TRANSFORMERS (AND) CERAMIC POWER TRANSFORMERS, by C. M. Stearns and S. W. Tehon. Quarterly rept. no. 6, 1 Oct 60-1 Jan 61, on Contract DA 36-039-sc-78346 (and) Interim development rept. no. 2, 1 Oct 60-1 Jan 61, on Contract NObsr-81369. 1 Jan 61, 155p. 9 refs. AD-252 562.

DESCRIPTORS: *Delay lines, *Transformers, *Radio-frequency filters, Power transformers, *Miniature electronic equipment, Transducers, Ferroelectric materials, Polarization, Ceramic materials.

The theoretical and experimental investigations of the effects of terminations on ceramic transformer characteristics, methods of shunt and series-tuning for increasing the effective bandwidth, effects of electrode area and position on bandwidth and cascade networks for response shaping are summarized. The longitudinal and circular polarization techniques developed and the newly developed torsional transformers are described. Brief descriptions on ceramic high voltage transformers, gyrators, active transducers and sonic delay lines with both metallic and quartz wire delay media are included. One hundred experimental samples to illustrate these various phases were fabricated. These samples are described, typical response curves are presented and the pertinent characteristics of these samples are summarized. (Author)

PB 162 623 $3.60

General Electric Co., Syracuse, N. Y.
STUDY TO IMPROVE ACCURACY OF MULTI-BEAM TRACKING IN CATHODE RAY TUBES, by Milton E. Russell. Quarterly rept. no. 1, 1 Apr-30 June 59, on Contract NObsr-77536. 11 Sep 59, 35p. 4 refs. AD-226 041.

DESCRIPTORS: *Cathode ray tubes, *Electron beams, Electron guns, Electron tubes, Theory, Electrostatic fields, Design, Deflection.

Efforts are being made to improve the accuracy of multi-beam tracking in cathode ray tubes. The work is being performed in 3 phases. The purpose of phase I is to conduct a theoretical study of the problem of multi-gun tracking and investigations in which an approach and method will be determined to increase the accuracy. A design objective of an accuracy of 1/10 of one percent is being used for the theoretical investigation. An experimental tube will be constructed using the optimum theoretical design. Based upon the theoretical findings of phase I and an evaluation of the performance of experimental tubes, the purpose of phase II is to design a practical electrostatically focused and deflected two-gun tube whose beam will track with an accuracy of at least .5 percent between guns, using the present state of the art. The purpose of phase III is to construct two tubes of the approved design. (Author)

PB 162 624 $3.60

General Electric Co., Syracuse, N. Y.
STUDY TO IMPROVE ACCURACY OF MULTI-BEAM TRACKING IN CATHODE RAY TUBES, by Milton E. Russell. Quarterly rept. no. 2, 1 July-30 Sep 59, on Contract NObsr-77536. 15 Oct 59, 35p. 4 refs. AD-228 768.

DESCRIPTORS: *Cathode ray tubes, *Electron beams, Electron guns, Electron tubes, Tracking, Errors, Design, Tests.

Objectives of the study are to attain theoretical tracking accuracies of .1 percent and to complete sample dual-beam tubes of practical design having accuracies of at least .5 percent. Two basic problem areas are the source of tracking errors in multi-gun tubes. One is the construction error problem where imperfect electrode positioning causes errors such as trace misalignments, pattern distortion, etc. The other is inherent in present systems and is, in effect, due to the fact that two or more non-linear sweep systems are not coincident. Seven approaches are being studied in an effort to achieve improved tracking. Six involve approaches to improve the theoretical tracking accuracy, and the seventh concerns the mechanical or construction error problem. The approaches and results to date are summarized. (Author) (See also PB 162 623)

PB 162 685 $4.60

Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
STUDY AND DEVELOPMENT OF TRANSISTORIZED MODULAR POWER CONVERTERS, by Howard Horsman and Charles Kurkul. Quarterly progress rept. no. 1, 1 July-30 Sep 60, on Contract DA 36-039-sc-85369. [1960] 49p. 7 refs. Rept. no. HSER 2215. AD-250 188.

DESCRIPTORS: Voltage amplifiers, Voltage regulators, Power transformers, Transistors, *Direct current, Electronic equipment, *Power supplies, Reliability, Switching circuits.

Research is presented on the development of transistorized modular power converters. An analytical study of existing system concepts (phase I of the program) was made. Conclusion are reported. This concept study is essentially completed, and the second phase, circuit design and development is being started. A summary of conclusions shows that the optimum converter system consists of a 1200c free-running driver stage, a push-pull power stage and transformer output to obtain the desired output voltage level. Combinations of modules to obtain specific performance requirements (power rating, input voltage, output voltage) appear feasible for the power range up to 250 watts. Also, the feasibility of obtaining inverter action by providing additional modules appears very promising. Circuit design and breadboard manufacture and testing will be required during the second phase to verify these conclusions. (Author)

PB 162 684 $4.60

Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
STUDY AND DEVELOPMENT OF TRANSISTORIZED MODULAR POWER CONVERTERS, by Howard Horsman and Frank L. Raposa. Quarterly progress rept. no. 2, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85369. [1960] 46p. 5 refs. Rept. no. HSER 2224; AD-253 823.

DESCRIPTORS: Transistors, *Power supplies, Direct current, Electronic equipment, Power transformers, Voltage amplifiers, Voltage regulators, Reliability, Design, Tests, *Electronic circuits, Switching circuits, Magnetic amplifiers, Trigger circuits, Oscillators, Analysis.

The analytical study of existing power conversion, concepts (DC to DC) was continued. Two paper designs were worked out and circuits were breadboarded. One design utilizes pulse width modulation for voltage regulation; the other design utilizes supply voltage amplitude control for output voltage regulation. The purpose of these designs is to compare the two methods of voltage regulation to determine which method will be more suitable to the modular concept. Breadboard construction was nearly completed and extensive data was obtained on some of the sub-circuits. No problems were encountered in the oscillator stage, the power stage, the controlled rectifier stage, and the filter stage. The only problem encountered was with the magnetic amplifier which is used to trigger the controlled rectifiers. (Author) (See also PB 162 685)

UCRL-6547 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
A CATHODE-RAY SWITCH TUBE WITH 11 CHANNELS OF ELECTRON MULTIPLICATION, by R. Kalibjian. Rept. on Contract W7405-eng-48. 20 Dec 61, 23p. 12 refs.

AD-276 250 $6.60

Linden Labs., Inc., State College, Pa.
CRYSTAL CHEMISTRY OF CERAMIC DIELECTRICS, by W. R. Buessem, W. A. Weyl, and P. A. Marshall, Jr. Quarterly rept. no. 8, (Rept. no. 14) 15 Dec 61-15 Mar 62, on Contract DA 36-039-sc-78912. 15 Apr 62, 65p.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, Dielectric properties, *Dielectrics, Ferroelectric materials, Glass, *Barium compounds, Titanates, Titanium compounds, Vanadium compounds, Oxides, Deterioration, Crystal structure, Chemical impurities, Electrical properties, High temperature research, Phase studies, Test methods.

Investigations on $BaTiO_3$ are directed toward a better understanding of degradation and developing a quantitative theory of the degradation process for the purpose of predicting life over extended periods. Measurement and interpretation of processes occurring early in the life of the dielectric can be used for predicting life expectancy are discussed. One technique involved the simultaneous measurement of the resistivity and the losses. Another was concerned with the measurement of charging-discharging currents in 15-minute cycles, combined with a recovery study at temperature or at elevated temperatures. The last part of the $BaTiO_3$ study deals with the measurement of voltage distribution in a $BaTiO_3$ blank under DC-stress at 200°C. The evaluation of these results revealed the generation of rather large space-charge clouds near the electrodes and their movement into the interior. Further experiments on enforced glass formation in systems containing vanadium pentoxide as a major constituent are reported. (Author)

PB 162 558 $4.60

Linden Labs., Inc., State College, Pa.
HIGH TEMPERATURE CERAMIC DIELECTRICS, by W. R. Buessem and P. A. Marshall, Jr. Quarterly rept. no. 1 (Rept. no. 7) on Contract DA 36-039-sc-78912, continuation of Contract DA 36-039-sc-75036. 15 Apr 60, 48p. 4 refs.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, *Dielectrics, *Barium compounds, Titanates, Fluorination, Niobium compounds, Tantalium compounds, Oxides, X-ray diffraction analysis, *Semiconductors.

This report contains the results of two different studies. One is the continuation of experiments on fluorine treatment of $BaTiO_3$-bodies, comprising new life-test data, weight loss measurements and an X-ray investigation of reaction products. The other study is concerned with a

new series of $BaTiO_3$ with Nb_2O_5 - and Ta_2O_5 additions. Nb and Ta were contained in the old series 32 and 33 where they resulted first in a moderate stabilization and - with larger additions up to 0.256% b.m. (by mole) Nb_2O_5 or Ta_2O_5 - in semiconductivity. This semiconductivity has been studied in other laboratories and it has been shown that these materials (with an optimum content of pentavalent oxide of 0.3% b.m.) belong to the class of PTC-bodies (bodies with positive temperature coefficient of resistivity). However, additions of 1% b.m and more lead to highly insulating materials. This report contains a study of 32 compositions in the transition range from semiconductivity to insulating behavior. A theory for this transition is proposed and it is shown - theoretically and experimentally - that the bodies which are insulating just above the semiconducting range are very stable. (Author) (See also PB 162 691)

PB 162 559 $7.60

Linden Labs., Inc., State College, Pa.
HIGH TEMPERATURE CERAMIC DIELECTRICS (SUMMARY OF DEGRADATION), by W. R. Buessem and P. A. Marshall. Quarterly rept. no. 6, (Rept. no. 12) 15 June-15 Sep 61, on Contract DA 36-039-sc-78912. 15 Oct 61, 75p. 18 refs.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, *Dielectrics, Degradation, Ferroelectric materials, *Titanium compounds, Oxides, *Barium compounds, Titanates, Electrical properties, Thermal stresses, Voltage, Stresses, Oxygen pressure, Fluorination, Impurities.

This report contains a summary of research and development work on stabilization of titanate ceramics against degradation at high temperatures. Part I contains pertinent facts about the electrical properties of TiO_2-bodies with, and without, additions of selected impurities, especially the change of the delta with time, conductivity at high temperature and lifetime under DC-voltage at high temperature. Part II contains a discussion of electrical properties of $BaTiO_3$-bodies, stressing the effects of one-sided surface treatment with higher-valent cations, of oxygen-pressure and of fluorine treatment on life-time. Part III is a condensation of all pertinent facts about degradation. It is proposed that degradation is due to inhomogeneities in these dielectrics which lead to strong local fields across the layers with high resistivity and, therefore, breakdown of these layers by Zener breakdown and by injection of anion-vacancies.

AD-272 569 $5.60

Linden Labs., Inc., State College, Pa.
HIGH TEMPERATURE CERAMIC DIELECTRICS, by W. R. Buessem, W. A. Weyl, and P. A. Marshall, Jr. Quarterly rept. no. 7 (Rept. no. 13) 15 Sep-15 Dec [61] on Contract DA 36-039-sc-78912. 15 Jan 62, 51p. 4 refs. Rept. no. 13.

DESCRIPTORS: *Ceramic capacitors, Dielectric films, Ferroelectric materials, *Ceramic materials, *Barium compounds, Titanates, Tantalum compounds, Vanadium compounds, Oxides, *Dielectrics, Dielectric properties Crystal structure, Phase studies, High temperature research, Low temperature research, Processing, Determination, Capacitors, Tantalum capacitors, Glass capacitors, Materials.

The first two parts of this report deal with dielectric materials in the ternary system BaO-TiO_2-Ta_2O_5. Part I contains an X-ray investigation of the complete series which reveals the presence of a second phase in addition to the main perovskite phase in several of these bodies. High resolution recordings of the (002)/(200) line pairs of the perovskite phase indicate a distribution of c/a-ratios of the crystallites present. This is in agreement with the findings of Part II which show the temperature dependence of the dielectric constant from -65°C up. In Part III the recovery of dielectrics after degradation is investigated and it is shown that a one-hour heat treatment at the silver firing temperature restores the body practically to the initial conditions. Part IV deals with charge and discharge phenomena, of $BaTiO_3$, under the conditions of a normal degradation experiment (200°C, 2.5 volt/mil DC). (See also PB 162 559)

PB 162 686 $7.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem, P. A. Marshall, Jr., and S. R. Butler. Quarterly rept. no. 1 on Contract DA 36-039-sc-75036. 31 July 58, 71p. 6 refs.

DESCRIPTORS: *Ceramic materials, *Ceramic capacitors, *Dielectrics, *Barium compounds, Titanates, Thermal stresses, Voltage, Stresses, Lanthanium compounds, Oxides, *Semiconductors, Lattices, Enthalpy, Degradation.

This report contains experiments on the dependence of the lifetime of $BaTiO_3$-dielectrics upon temperature and voltage-stress. A semi-empirical formula is proposed which contains three constants: the thermal breakdown voltage, the infinite lifetime voltage and the degradation rate constant. This formula fits well and the data on $BaTiO_3$; however, much more experimentation is necessary to test its general applicability. (Author)

PB 162 687 $5.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem and P. A. Marshall, Jr. Quarterly rept. no. 2 on Contract DA 36-039-sc-75036. 31 Oct 58, 53p.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, *Dielectrics, Degradation, *Barium compounds, Titanates, Fluorination, Lanthanum, Electrical properties, *Semiconductors.

This report contains the first results of experiments to combine the beneficial effects of additions of higher-valent cations and of fluorine treatment. It can be concluded that fluorine introduced into the titanate lattice in large amounts enhances the semiconducting properties of the barium titanate bodies with lanthanum additions. Some of the $BaTiO_3$-lanthanum-fluoride bodies

have high dielectric constants, up to 16,000, which are constant within 5-10% from 230°C to 460°C. (See also PB 162 686)

PB 162 688 $5.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem and P. A. Marshall, Jr. Quarterly rept. no. 3 on Contract DA 36-039-sc-75036. 31 Jan 59, 52p.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, *Dielectrics, Degradation, *Calcium compounds, Titanates, *Titanium compounds, Oxides, Fluorination, Voltage, Stresses.

This report contains lifetime studies of $CaTiO_3$- and TiO_2-dielectrics up to 350°C and 100 volts/mil voltage-stress. A theoretical lifetime formula is developed, assuming a linear change of the resistivity with time. This formula is compared with the previous lifetime formula which was based on a logarithmic change of the resistivity with time. In the range of the rather short lifetimes which have been covered experimentally so far, the two formulae give similar results and cannot be distinguished experimentally. New experiments on fluorine treatment are presented, using HF-gas from a tank and an alumina tube furnace. The reproducibility with this method was not satisfactory because of reactions of the HF-gas with the metal in the tank. However, it was possible to produce samples which compared favorably with the best samples produced previously with the "conditioned furnace" method. (Author) (See also PB 162 687)

PB 162 689 $5.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem and P. A. Marshall, Jr. Quarterly rept. no. 4 on Contract DA 36-039-sc-75036. 30 Apr 59, 60p. AD-220 350.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, *Dielectrics, Degradation, *Barium compounds, Titanates, Fluorination, Uranium, Thermal stresses, Voltage, Stresses.

A new procedure, called thermal breakdown test, was formulated for the investigation of rather stable materials. The test consists of a slow increase of voltage stress at constant temperature to maintain thermal equilibrium; the resistivity of the sample is measured continuously until breakdown occurs. The rate chosen for the first try-outs was 200 v increase/min. The new procedure was applied to $BaTiO_3$-bodies containing uranium. The thermal-breakdown voltages obtained are lower than those expected from previous life-time studies due to a difference in the manufacturing of these materials. The evidence points to the fact that the stable U-containing bodies also have an insulating layer at the grain boundaries as have the bodies with fluorine treatment. The fluorine treatment of fired $BaTiO_3$ bodies in HF-atmosphere at temperatures 400-650°C below the original firing temperature was studied in an alumina tube furnace. The results indicate that at low to intermediate temperatures, high HF-concentration produces effects similar to low HF-concentration at high temperatures. The best materials obtained in this way are slightly inferior to the best materials manufactured by fluorine treatment during the original firing. (Author) (See also PB 162 688)

PB 162 690 $7.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem and P. A. Marshall, Jr. Quarterly rept. no. 5 on Contract DA 36-039-sc-75036. 30 July 59, 72p. AD-228 195.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, *Dielectrics, Degradation, *Barium compounds, Titanates, Fluorination, Production.

This report contains complete data on the properties of a series of $BaTiO_3$ bodies, treated in a stream of 10% HF air-mixture at temperatures between 850°C and 1200°C. The 1000°C treatment produced rather stable bodies which survived up to 600 hours at 350°C and 10 volts/mil. The resistivity of the best bodies in this series was 6 Megohm-cm at 400°C as compared with 150 Megohm-cm achieved by fluorine treatment at 1450°C in the original firing. A new method for fluorine treatment has been tried which is static as compared with the air-HF-stream method. The treatment temperatures were 1350°C and 1450°C and the concentration of the total HF added varied from 1×10^{-5} mole to 6×10^{-4} mole. The improvement of the resistivity as compared with the blank was up to 1000 times. The reproducibility of this method seems to be better than that of the two former methods; however, it is still only fair. As a means to improve the understanding of the mechanism of breakdown, a lifetime study of the $BaTiO_3$ body stabilized with 0.25 mole % UO_3 is presented, amended by data on other properties. This body is described as dielectrically "brittle": it either breaks instantly or it does not break at all. The intermediate lifetimes at intermediate voltage-stresses, which are due to slow degradation, are missing in this body. (Author) (See also PB 162 689)

PB 162 691 $5.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem and P. A. Marshall, Jr. Quarterly rept. no. 6 (Final) on Contract DA 36-039-sc-75036. 31 Dec 59, 60p. AD-234 750.

DESCRIPTORS: *Ceramic capacitors, *Ceramic materials, *Dielectrics, Production, Barium compounds, Titanates, Fluorination, Aging, Resistance, Degradation.

This report contains the evaluation of the fluorine treatment of five commercial bodies, i.e., a K 40 (NPO), K 1750, K 3000, K 4000 and K 6000 body. An improvement of the life time has been achieved in all cases. In the cases of the K 1750, K 4000 and K 6000 bodies the high temperature resistivity (200°-300°C)

has also been improved by a factor of 20-30. The absolute values of all resistivities achieved are rather similar, and the activation energies of the four high-K bodies are identical. The fluorine treatment of the commercial bodies has also a very beneficial effect of the K-aging rate: in one case, the aging rate is reduced from 3.6% per dekade to 0.55%, in two other cases from 2.2% to 0.82% resp. from 2.1 to 1.05%. In connection with the attempts to gain a fuller understanding of the reactions during the fluorine treatment, an extensive weight loss study in the presence of fluorine during firing and also without fluorine was undertaken. (Author) (See also PB 162 690)

PB 162 438 $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
DEVELOPMENT OF A METHOD FOR MEASUREMENT AND CONTROL OF ATMOSPHERIC CONCENTRATION OF SILICONE VAPOR IN CONNECTION WITH STUDIES OF BRUSH WEAR IN ENCLOSED ELECTRIC MOTORS, by I. J. Stanley and B. R. Simms. Progress rept. 1. 1 June 60, 15p. 3 refs. Lab. Project 5332-15, Part 2.

DESCRIPTORS: *Electric motors, Power equipment parts, *Carbon brushes, *Lubricants, *Silicones, Vapors, Control, Measurement, Infrared spectroscopy.

A procedure has been developed for producing test atmospheres containing known and controlled concentrations of silicone vapors in an air stream, for use in the evaluation of accelerated contact brush wear in totally enclosed electric motors constructed with insulations consisting of silicone type materials. In addition, the technique utilized, based on the quantitative infrared spectral absorbance of silicone type materials at 7.95 microns, appears to be feasible for use in the direct measurement of silicone vapor concentrations of the order of parts per billion. (Author)

MURA-644 $0.50

Midwestern Universities Research Association, Madison, Wis.
THE EXCITATION OF A CIRCULAR CYLINDRICAL CAVITY BY A CIRCULAR WAVEGUIDE, by C. Bjerke and J. Van Bladel. Rept. on Contract AT(11-1)-384. 20 July 62, 19p. 3 refs. NASA N63-10070.

PB 162 628 $6.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
INVESTIGATION OF THE MEASUREMENT OF NOISE, by Alfred Eckersley, David B. Geselowitz, and Pietro P. Lombardini. Progress rept. no. 33 on Contract NObsr-49128. 15 July 54, 63p. Research Division rept. no. 54-48.

DESCRIPTORS: *Noise (Radio), Measurement, Noise analyzers, Meters, *Measuring devices (Electrical and Electronic), Radiofrequency, *Pulse generators, Intermediate frequency, Intermediate frequency amplifiers.

Contents:
Technical progress
Radio frequency overload in AN/URM-6, AN/PRM-1 and TS 587-U noise meters
Evaluation of URM-47 impulse generator
I. F. overload measurements on the URM-6 and PRM-1

PB 162 674 $14.00

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM. Quarterly rept. no. 10, 1 July-1 Oct 60, on Contract DA 36-039-sc-75968. [1960] 202p. AD-250 743.

DESCRIPTORS: *Electronic circuits, Diodes, *Subminiature electronic equipment, Design, Semiconductors, Transistors, Capacitors, Resistors, Crystals, Digital computers, Production, Electronic equipment, Circuits, Communication equipment, Reliability, Coils, Radio communication systems, Packaging,

Production and testing of final-grade capacitor micro-elements for modules was completed. A micro-module trimmer capacitor was tried as a means of adjusting the tunning rf modules after encapsulation. Tests on resistors are continuing. Production and testing of final-grade inductor micro-elements for modules were completed and acceptance tests are continuing. Final-grade modules are in life-test. Catalysts are being studied for use with the Stycast 2651-40 encapsulant. Work on the new micro-module assembly fixture, the development of header-type assembly methods and methods for mechanical measurements on completed modules is continuing. Six RF and six AF subassemblies were constructed and tested. Tests gave generally satisfactory results. A second model of an operational AN/PRC-34 micro-modular receiver utilizing an individual copper shield can for each of the modules was constructed and tested with satisfactory results. The preliminary design of the AN/PRC-51 helmet radio set was completed. Organization of the MicroPac System was completed. Several new MicroPac circuits were designed, some circuit modifications were made, and a detailed block diagram of the memory system was prepared. (Author)

PB 162 622 $9.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
CONTINUOUS NONLINEAR SYSTEMS, by Donald A. George. Doctoral thesis. Rept. on Contract DA 36-039-sc-78108. 24 July 59, 106p. 11 refs. Technical rept. 355; AD-246 281.

DESCRIPTORS: *Communications theory, Control systems, *Servo systems, Synthesis, *Functional analysis, Integral transforms, Series, Nonlinear systems.

A functional representation, which is a generalization of the linear convolution integral, is used to describe continuous nonlinear systems. Emphasis is placed on nonlinear systems composed of linear subsystems with memory, and nonlinear no-memory subsystems. An Algebra of Systems is developed to facilitate the description of such combined systems. From this alge-

braic description, multidimensional system transforms are obtained. These transforms specify the system in much the same manner as one-dimensional transforms specify linear systems. The system transforms and the transform of the system's input signal are then used to determine the transform of the output signal. Transform theory is also used for determining averages and spectra of the system output when the input is a random signal Gaussianly distributed. Certain theoretical aspects of the functional representation are discussed. (Author)

PB 162 646 $4.60

Stanford Electronics Labs., Stanford U., Calif.
COUPLED HELIX ATTENUATORS FOR TRAVELING-WAVE TUBES, by Owen George Owens. Rept. on Contract N6onr-251, T.O. 7. 26 Aug 53, 50p. 7 refs. Technical rept. no. 68; AD-18 468.

DESCRIPTORS: *Traveling wave tubes, Attenuators, *Radiofrequency attenuators, Helixes, Couplings, Attenuation.

An investigation was made of the problem of constructing a coupled-helix device which would operate over a wide range of frequencies. The attenuator is intended for use with a high-power hollow-beam traveling-wave tube operating over the 70- to 300-mc range. A theoretical analysis of the problem is presented. Tests of experimental helixes indicated that attenuation by such devices is possible, and that a terminated low-loss coupled helix can be made to have a broad range of attenuation. By taking into account the dielectric loading of the tube envelope, an outer helix with synchronous velocity can be designed on the basis of an equivalent unloaded inner helix. The positions of attenuation maxima and the shape of the attenuation curve can be predicted in this way with fair accuracy.

AD-274 757 $4.60

Stanford Electronics Labs., Stanford U., Calif.
A FAR-INFRARED SPECTROMETER FOR MASER STUDIES, by R. A. Soref. Rept. on Contracts AF 33(616)7944, AF 33(616)6207, and AF 49(638)660. 8 Dec 61, 41p. 12 refs. Technical rept. no. 156-7; AFOSR-2298.

DESCRIPTORS: *Infrared spectrophotometers, *Infrared spectroscopy, Measurement, Materials, Solid state physics, *Masers, Design, Construction, Test equipment, Optics, *Infrared detectors, Absorption, Thermionic emission, Monochromatic light, Focusing, Tests, *Infrared equipment, Electronic equipment, Electronic circuits, Packaging, Infrared research.

This report describes the design, construction, and performance of a grating spectrometer designed to measure the emission and absorbtion spectra of solid-state maser materials. The spectrometer covers the wavenumber region from 65 to 195 cm^{-1}, and a resolution of 1.1 cm^{-1} at 105 cm^{-1} was achieved under typical operating conditions, as is evident from absorbtion spectra of atmospheric water vapor. The spectrometer employs a photoconductive Ge:Sb radiation detector whose detectivity D^* (88μ, 1000, 0.009) was estimated to be the order of magnitude of 10^9 cm cps $^{1/2}/w$ at 4.2 ^oK. (Author)

AD-282 632 $3.60

Stanford Research Inst., Menlo Park, Calif.
STABLE SLIDING CONNECTOR CONTACTS, by Jack R. Anderson. Semiannual technical rept. no. 1, 1 Dec 61-30 May 62, on Contract DA 36-039-sc-89150. 1 June 62, 38p. 11 refs. Rept. no. 3; SRI Proj. no. PMU-3915.

DESCRIPTORS: *Electric connectors, *Sliding contacts, *Miniature electrical equipment, *Miniature electronic equipment, Amines, Lubricants, Thin films, Monomolecular films, Gold, Copper, Crystallization, Electronic circuits, Circuits.

Surface treatments, which decrease friction and wear, through boundary lubrication, offer a promising approach to improve the reliability of dry circuit, miniature connectors. Simultaneous measurement of frictional forces and contact resistance was used to determine the effectiveness of octadecylamine hydrochloride monolayers on gold, copper, and gold-plated copper, i.e., the film was not broken through after 600 to 1000 traverses with a 500-g loading force, and the contact resistance was like that of metal-metal. The substrates were extracted in benzene and heat-cleaned prior to application of the monolayer. Prolonged heating caused recrystallization of the gold surface, which prevented monolayer adsorption and resulted in no lubricant durability. Octadecylamine hydrochloride films on gold-plated pins proved effective in reducing connector insertion and withdrawal forces to about one-fifth. Lubrication durability was observed as a function of mating cycles and was found to be adequate over hundreds of cycles, depending on the spring loading force. Both unlubricated and lubricated connector resistance was about 2 milliohms. The coefficient of friction for lubricated connectors was 0.2-0.3, which is consistent with results on lubricated gold and gold-plated copper. (Author)

PB 162 738 $4.60

Wilson, H. A., Div., Engelhard Industries, Inc., Union, N. J.
DEVELOPMENT OF IMPROVED METALLIC MATERIALS FOR ELECTRONIC COMPONENTS OPERATING AT HIGH TEMPERATURE, by V. G. Mooradian. Bimonthly progress rept. no. 4, 1 Oct-30 Nov 59, on Contract NObsr-77085 [1959] 41p. 20 refs.

DESCRIPTORS: *Electronic equipment, Springs, *Heat resistant alloys, Iron alloys, Manganese alloys, Nickel alloys, Chromium alloys, Molybdenum alloys, Aluminum alloys, Titanium alloys, Cobalt alloys, Electrical properties, *Measuring devices (Electrical and Electronic), High temperature research.

A literature search has been completed on a "first-round" basis. The search will continue on newly published reports and new references. A summary of data obtained from the literature search for spring materials is presented in tabular, as well as graphical, form. A number of spring materials and conductive materials have been received, machined, heat treated and exposed at various times to test temperature, and have been tested in tension at elevated temperature as a routine procedure. In order to present a running summary of

testing accomplished, progress charts for spring materials and conductive materials are presented. Design changes of the elevated temperature electrical contact tester have been completed, and a finished unit is now in operation. (Author)

Ordnance, Missiles, and Satellite Vehicles

PB 162 643 $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN EXPERIMENTAL DETERMINATION OF DETONATION PRESSURE IN TWO SOLID HIGH EXPLOSIVES, by J. W. Gehring, Jr. and J. Dewey. Apr 55, 16p. 10 refs. Rept. no. 935.

DESCRIPTORS: *Explosives, *Pentolite, *RDX, *TNT, Explosions, *Detonation waves, Pressure, Shock waves, Determination, High speed photography, *Flash radiography.

A method of determining detonation pressure of solid explosives by flash radiography of steady state contact detonations is described. Results on 50-50 Pentolite and Composition B are somewhat higher than computed values usually reported. (Author)

NASA N63-11741 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
USE OF A SEALED SILVER-CADMIUM BATTERY ON EXPLORER XII, by T. J. Hennigan and A. O. Apelt. Jan 63, 9p. Technical note TN-D-1543; also announced as NASA N63-10258.

AD-269 127 $5.60

Institute of Aerophysics, U. of Toronto (Canada).
STABILITY OF FLIGHT PATHS OF LIFTING VEHICLES DURING ENTRY INTO PLANETARY ATMOSPHERES, by J. H. Fine. July 61, 54p. 10 refs. UTIA Technical note no. 48; AFOSR 1488; NASA N62-14715.

DESCRIPTORS: *Re-entry vehicles, Flight paths, Errors, Oscillation, Dynamics, Pitch, Re-entry aerodynamics, Atmosphere entry, Stability (Lateral), Stability, Mathematical analysis.

Small pitching oscillations in a manned lifting vehicle about its trim angle of attack were analyzed for their ability to deflect the vehicle from its trim trajectory. Several planetary atmospheres along with both circular and hyperbolic velocities were considered. The results of this investigation were conclusive. Except for those cases when the static margin of the vehicle was so small as to be impractical, i.e. less than 10^{-3}, the pitching oscillations were unable to cause an appreciable deviation from the reference path. (Author)

PB 162 703 $23.50

Joint Military Packaging Training Center, Rossford Ordnance Depot, Toledo, Ohio.
COURSE OUTLINE FOR 400-L-F5 (II) PACKING AND CARLOADING. July 62, 468p. 260 refs. Supersedes course outline dated Jan 60, PB 181 086.

DESCRIPTORS: *Containers, *Packaging, Military requirements, *Cargo, Loading, Handbooks.

Contents:
Introduction to packing and carloading
General departmental packing policies
Nailed wood boxes
Fiberboard boxes
Triple wall fiberboard boxes
Cleated panel boxes
Wirebound wood boxes
Waterproof barrier materials
Crates
  Introduction
  Materials, components
  Specification requirements (MIL-C-104)
Crates: open slotted angle crate
Special purpose containers
Blocking, bracing and cushioning
Marking
Packing inspection
Freight regulations
Air freight
Packing cost
Carloading
Closed cars and trucks
Open cars

PB 171 809-4 $2.00

Martin [Marietta Corp.] Denver, Colo.
CRYOGENIC MATERIALS DATA HANDBOOK, by F. R. Schwartzberg, R. D. Keys, and S. H. Osgood. Progress rept. no. 12 on Contract AF 33(657)9161. 15 Oct 62, 154p. 23 refs.

DESCRIPTORS: *Cryogenics, Metals, Materials, Aluminum, Cobalt, Copper, Iron, Nickel, Titanium, Carbides, Ice, Nylon, Plastics, Halocarbon plastics, Beryllium, Molybdenum, Alloys, Low temperature research, Mechanical properties, Welded joints, Tensile properties, Fatigue (Mechanics), *Guided missiles, Handbooks.

See also PB 171 809-3

PB 162 678 $4.60

Space Technology Labs., Inc., Los Angeles, Calif.
DESIGN OF NUMERICAL FILTERS WITH APPLICATION TO MISSILE DATA PROCESSING, by Joseph F. A. Ormsby. [Rept. on Contract AF 04(647)309]. Mar 60, 47p. 9 refs. Rept. no. STL/TR-60-0000-09123

DESCRIPTORS: Electric filters, *Band-pass filters, Design, Guided missiles, Telemetering data, Data, Processing, Signals, Detection, *Data processing systems, Digital systems.

A discussion of the process of numerical (digital) filtering is presented together with formulae for a particularly simple but effective design. The error is discussed in terms of the quantity ε (λ, N) with λ the normalized frequency and N the number of filter weights. Later empirical design curves with ε as a parameter are given. In addition, the effect of allowing slope discontinuities in the filter transfer function is noted. Next, the problem of dc type errors and their elimination by the inclusion of additional constraints on the filter weights is included. Designs for high pass, band pass and quadrature filters, with a comparison of two band pass design approaches, are given. Specific applications are given to illustrate the effect of the filtering process as well as the various ways filters can be used in processing digital data. (Author)

PB 162 604 $10.50

Weapons Guidance Lab. [Aeronautical Systems Div.] Wright-Patterson AFB, Ohio.
DOPPLER NAVIGATION SYSTEMS: PRINCIPLES AND PRACTICE, by Walter R. Fried. Rept. on Study of Precision Navigation Techniques. Dec 57, 132p. 59 refs. WADC Technical note 57-175; AD-118 271.

DESCRIPTORS: *Doppler navigation, *Doppler systems, Doppler radar, *Radar equipment, *Radar navigation, Airborne, Errors, Analog computers, Digital computers, Compasses.

The over-all performance characteristics for a Doppler navigation system are analyzed as well as their dependence on the various characteristics of the major components: the Doppler radar, the computer, and the heading reference. Results showed that in the present systems, the heading error tends to swamp the other errors in the system. Over-all position errors, in percent of distance travelled, decreased with distance. Typical systems provide information on ground speed, drift angle, present position, and course and distance to destination. Doppler navigation systems have been or are being built which will produce maximum (95% probability) position errors less than 1.5% of distance travelled over land and less than 2% of distance travelled over extreme sea states. Typical modern Doppler navigation systems, including computer and heading reference, weigh between 150 and 200 lb with a volume between 5 and 9 9 cu ft. Current research and development effort is concentrated along lines of increased system accuracy, particularly over water; increased heading reference accuracy; decreased size and weight; and maximum system reliability. Derivations of Doppler fluctuation errors and vertical altitude errors are appended as well as a compilation of the operational and technical characteristics of the most important existing complete Doppler navigation systems, Doppler radars, dead reckoning computers, and heading references. (ASTIA abstract)

Sanitation and Safety Engineering

PB 162 682 $5.60

Armour Research Foundation, Chicago, Ill.
A SIMPLE METHOD FOR EVALUATING BLAST EFFECTS ON BUILDINGS, by F. R. Halpern. Rept. on Contracts AF 33(038)9761, AF 33(038)20054, AF 33(038)23270, and AF 33(616)163. July 52, 56p. 8 refs.

DESCRIPTORS: *Buildings, Structures, *Blast, Load distribution, Elasticity, Plasticity, Deflection, Equations of motion, Atomic bomb explosions, Mathematical analysis.

This report presents a simple method which can be used in the evaluation and design of buildings in terms of their resistance to horizontally applied blast forces, such as those caused by an atomic bomb. A knowledge of advanced mathematics, dynamics, or fluid flow is not necessary for the use of this method and only techniques familiar to structural engineers are employed. The limitations and accuracies of these procedures are discussed and a numerical example is given. The background and explanations of the methods employed are given in two appendices relating to methods for determining blast loadings and to solutions of the equations of motion, respectively.

PB 162 664 $11.50

Boynton [William W.] and Associates, La Canada, Calif.
FEASIBILITY STUDY OF EXPERIMENTAL INVESTIGATION OF NEUTRON AND GAMMA RAY ATTENUATION, by Wm. W. Boynton. Final rept. on Contract NBy-3160. Jan 59, 155p. 158 refs.

DESCRIPTORS: *Protective shelters, *Materials, *Soils, Neutrons, *Gamma rays, Penetration, Attenuation, *Shielding, Neutron flux, Detection, Measurement, Feasibility studies.

A feasibility study was conducted to determine the practicability of doing experimental work on the penetration of neutrons and gamma rays in various soils and materials used in the building of protective shelters, such as command posts.

HW-69561(rev.)(Del.) $1.25

Hanford Atomic Products Operation, Richland, Wash.
THE CONSEQUENCES OF ACCIDENTAL RELEASES DURING SHIPMENTS OF RADIOACTIVE CESIUM AND STRONTIUM, by E. C. Watson, R. L. Junkins and others. Rept. on Contract AT(45-1)1350. June 61, 47p. 43 refs.

NYO-4817 & NYO-4818 $9.10

Harvard School of Public Health, Boston, Mass.
AIR CLEANING STUDIES, by Richard Dennis, Leslie Silverman and others. Progress rept. 1 July 59-30 June 60, on Contract AT(30-1)841. 13 July 62, 95p. 32 refs.

WT-1475 $1.00

Harvard School of Public Health, Boston, Mass.
BLAST EFFECTS ON AN AIR-CLEANING SYSTEM, by Richard Dennis, Charles E. Billings, and Leslie Silverman. Rept. on Operation Plumbbob, Proj. 34.4. Apr 62, 47p. 5 refs.

UCRL-7035 $1.25

Lawrence Radiation Lab., U. of California, Livermore
HAZARDS CONTROL. Quarterly rept. no. 9, Apr-June 62, on Contract W-7405-eng-48. 46p. 20 refs.

DP-783 $0.50

Savannah River Lab., Aiken, S. C.
AUTOMATIC PROCESSING SYSTEM FOR FILM BADGES, by Joseph W. Adams. Rept. on Contract AT(07-2)-1. Sep 62, 23p. 1 ref. NASA N62-17975.

Y-1405 $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
DOSIMETRY BADGE ORIENTATION EXPERIMENT, by J. W. Redmond. Rept. on Contract W-7405-eng-26. 3 Oct 62, 25p. 3 refs. NASA N63-10290.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 162 627 $6.60

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
REMARKS ON ROCKET AND AERODYNAMIC APPLICATIONS OF MAGNETOHYDRODYNAMICS CHANNEL FLOW, by Theodore A. Wilson. Rept. on Contract AF 18(600)1523. Dec 58, 61p. 11 refs. [AFOSR] TN-58-1068; AD-207 228.

DESCRIPTORS: *Rockets, *Aerodynamics, *Rocket propulsion, *Magnetohydrodynamics, *Electric propulsion, Plasma physics.

Equations of magnetohydrodynamic channel flow are developed and the results are applied to rocket propulsion with unlimited energy supply Two rocket configurations are described in which the energy is limited to the energy supplied by the fuel of the rocket. Rocket payload energy is increased for a given rocket fuel energy by redistributing this energy; magnetohydrodynamics is a feasible way to accomplish the redistribution. Descriptions are presented of a magnetohydrodynamic generator, 2 magnetohydrodynamic devices of aerodynamic interest, a hypersonic wind tunnel, and a diffuser. (Author)

NASA N62-10350 $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PUBLICATIONS OF THE JET PROPULSION LABORATORY, JULY 1960 THROUGH JUNE 1961, by D. K. Walsh and R. J. Sippel. Rept. on Contract NASw-6. Dec 61, 59p. 308 refs. Bibliography no. 39-2.

PB 162 736 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A TWO-FLUID MAGNETOHYDRODYNAMIC CYCLE FOR NUCLEAR-ELECTRIC POWER CONVERSION, by David G. Elliott. Rept. on Contract NASw-6. 30 June 61, 18p. 10 refs. Technical rept. no. 32-116.

DESCRIPTORS: *Magnetohydrodynamics, Plasma physics, *Electric power production, *Nuclear energy, *Energy conversion, Thermionic converters, Fluid flow, Potassium, Vapors, Liquid metals, Electric propulsion.

Only a few methods are available for converting nuclear power to electric power without the use of moving mechanical parts. One method is to heat the working fluid to the plasma state and employ it as the moving conductor in a magnetohydrodynamic generator. For a lightweight system in the megawatt range, however, the plasma temperature required is beyond foreseeable reactor technology. To circumvent this limitation it is proposed that the MHD generator employ a liquid metal as the conductor, the metal being accelerated by the vapor of a second fluid in a two-phase nozzle and extracted by a liquid-gas separator. From available data on such devices it is estimated that a cycle efficiency of 10% is attainable at a radiator-to-reactor temperature ratio of 0.7. For a reactor coolant temperature of 2000°F suitable working fluids are potassium vapor and liquid lithium. The estimated specific weight of the two-fluid MHD conversion system is comparable to that of turbine-driven systems. (Author)

AD-264 380 $5.60

Naval Ordnance Test Station, China Lake, Calif.
EXPLOSIVE CUTTING, WELDING, AND COMPACTING OF METALS, by John Pearson. 1 Sep 61, 58p. 47 refs. NAVWEPS rept. 7760; NOTS TP 2732.

DESCRIPTORS: *Material forming, Explosives, *Explosives forming, *Cutting tools, Fracture (Mechanics), Demolitions, Shaped charges, Shock waves, Shear stresses, *Welding, Bonding, Surfaces, Plasticity, Deformation, Impact shock, Jets, Microstructure, Hardness, *Powder metallurgy, Powder metals, Metal forming presses, Hydroforming, Hydrostatic pressure, Compression shock, Phase transitions, Physical properties, Magnetic properties.

High explosives can be used to perform various metal working operations, among which are metal cutting, welding, and the high density compaction of metal powders. Each of these three types of operations is discussed in terms of the dynamics of the process, and the behavior of the material. Representative data is presented for each type of operation. (Author)

MATERIALS

PB 162 681 $3.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
EVALUATION OF A XEROGRAPHIC PROCESS FOR PREPARING ZINC OXIDE-SILICONE, BINDER-TYPE LITHOGRAPHIC PLATES, by Frederick C. Myers. Rept. for Aug 55-Feb 58, on Xerography Application to Map Reproduction. 23 Sep 58, 38p. Rept. 1545-TR.

DESCRIPTORS: *Maps, Production, *Lithography, *Electrophotography, *Binders, Zinc compounds, Silicones, Photographic chemicals, Photographic equipment.

The binder-plate process is an outgrowth of previous work done on selenium lithographic plates. The binder-plate process was evaluated by preparing duplicator size plates and conducting press tests. The report concludes that: (a) The xerographic binder-plate process is capable of producing plates for the reproduction of multicolored line maps and photomaps with an image quality approaching that of the conventional process. (b) The xerographic binder-plate process offers numerous advantages in comparison with the conventional process. (c) The xerographic binder-plate process offers numerous advantages in comparison with the selenium process. (d) The xerographic binder-plate process has one limitation in that it is detrimentally affected by high relative humidity. (e) Further work should be done to partially mechanize the development step in the xerographic binder-plate process and adapt the process to the making of 27 1/4- by 29 1/2-in., zinc oxide-silicone, binder-type plates for printing on the mobile reproduction press. (Author)

AD-268 432 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EFFECTS OF SPACE ENVIRONMENT UPON PLASTICS AND ELASTOMERS, by L. D. Jaffe. Rept. on Contract NASw-6. 16 Nov 61, 27p. 147 refs. Technical rept. no. 32-176.

DESCRIPTORS: *Plastics, Elastomers, Resins, Polymers, Organic coatings, Deterioration, *Radiation effects, Nylon, Sulfides, Cellulose, Acrylic resins, Esters, Epoxides, Urethanes, Silicones, *Space environmental conditions, Bibliography.

Most polymers will be stable in the vacuum of space at temperatures as high as they can withstand in air. The particles of the Van Allen radiation belts will damage engineering porperties of all exposed polymer surfaces; solar flare emissions will probably affect exposed surfaces of the materials more sensitive to radiation damage. Through a shielding thickness of 1 g/cm^2, only the more radiation-sensitive polymers will be damaged by the Van Allen belts, and solar flare emissions will cause no permanent damage. Sunlight of 100-1000 Å wavelength may significantly increase optical abosrption by the outer few thousand angstroms of an exposed surface. Longer solar wavelengths induce cross-linking to much greater depths, reducing elastomer flexibility and increasing optical absorption. Most other engineering properties are likely to be less affected by sunlight in space than on the Earth's surface. Meteoric erosion will produce on exposed surfaces a few pits, mostly smaller than 10^{-2}dm diameter; this pitting will be much more common close to Earth than away from it. When structural laminates are hit by larger meteoroids, spalling of pieces off the inside surface of the plastic will occur through considerably greater thicknesses than will perforation. (Author)

UCRL-6691 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
COLLECTION EFFICIENCY OF WHATMAN 41 FILTER PAPER FOR SUBMICRON AEROSOLS, by C. L. Lindeken, R. L. Morgin and others. Rept. on Contract W7405-eng-48. 9 Mar 62, 10p.

PB 162 683 $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
COATING STUDIES AT KWAJALEIN, KANEOHE, AND PORT HUENEME, by C. V. Brouillette and R. L. Alumbaugh. 2 July 62, 56p. 5 refs. Technical rept. R 197.

DESCRIPTORS: *Coatings, Protective coverings, *Bituminous coatings, Asphalt, Mica, Coal tar, *Metal coatings, Zinc coatings, Aluminum coatings, *Plastic coatings, Vinyl plastics, Epoxy resins, Urethanes, *Rubber coatings, Synthetic rubber, Steel, *Corrosion inhibition, Tests.

Twenty-nine protective coating systems were applied to sand-blasted steel test panels and placed on exposure in the marine atmospheres of Kwajalein, Marshall Islands; Kaneohe, Hawaii; and Port Hueneme, California. A mica-filled asphalt emulsion applied over a wash primer and a zinc chromate primer gave excellent protection to both scribed and unscribed panels for 5 years. Four additional coating systems gave, for the same period of time, protection which was superior to that given by the selected standard test coating, Saran. (Author)

PB 162 650 $1.60

Owens-Corning Fiberglas Corp. [Granville] Ohio.
INVESTIGATION OF METAL-GLASS COMPOSITE MATERIALS, by H. B. Whitehurst. Quarterly progress rept. no. 1, 15 Mar-15 June 55, on Contract NOrd-15764. [1955] 16p.

DESCRIPTORS: *Composite materials, Glass, Metals, *Glass textiles, *Zinc alloys, *Lead alloys, Production, Density, Tensile properties.

Three methods of combining glass fibers or flakes with metals have been proposed. In the first method, glass fibers can be coated with metals during the forming process, and these coated filaments can be compacted into solid materials using heat and pressure. In the second method, glass fibers of flakes are submerged in molten metal, and mixed to a uniform dispersion before the melt is allowed to solidify. The glass fibers in this process could be formed by any conventional method, and combined with the metal in a separate operation. In the third method the glass fibers are produced by introducing powdered glass into metals, and hot working the mixture at temperatures above the softening point of the glass.

PB 162 743 $2.60

Owens-Corning Fiberglas Corp. [Granville] Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by H. B. Whitehurst and H. B. Ailes. Quarterly progress rept. no. 4, 15 Mar-15 June 56, on Contract NOrd-15764. [1956] 26p. 2 refs.

DESCRIPTORS: *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, Rods, Tubes, Tensile properties, Production.

Work has been directed towards establishing the tensile strength properties of glass fibers and aluminum bars made by the vacuum injection process and towards de-

veloping methods for fabricating tubes made from filament wound glass fibers and aluminum. In addition, further efforts have been made to explore alternate methods for making glass-aluminum composite materials. (See also PB 162 650)
(Materials, 5 Apr 63)

PB 162 744 $2.60

Owens-Corning Fiberglas Corp. [Granville] Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by H. B. Whitehurst and H. B. Ailes. Quarterly progress rept. no. 5, 15 June-15 Sep 56, on Contract NOrd-15764. [1956] 23p. 4 refs. AD-141 174.

DESCRIPTORS: *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, Rods, Tubes, Production, Tensile properties.

Work has been in the following directions: (1) improving existing and investigating new methods of compositing aluminum and aluminum coated glass fibers; (2) establishing physical properties of aluminum coated glass fiber-aluminum composites; (3) reinforcing aluminum with bare glass fibers; and (4) production and testing of glass reinforced aluminum tubular shapes. (See also PB 162 743)
(Materials, 5 Apr 63)

PB 162 745 $2.60

Owens-Corning Fiberglas Corp. [Granville] Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by H. G. Whitehurst and H. B. Ailes. Quarterly progress rept. no. 6, 15 Sep-15 Dec 56, on Contract NOrd-15764. [1956] 23p. 6 refs. AD-141 320.

DESCRIPTORS: *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, Rods, Tubes, Production, Tensile properties.

Temperature, time, and the degree of dryness of fibers were studied as variables in the vacuum injection technique for making composites of glass fiber and Al. Variation of the molten Al temperature from 1100° to 1240°F does not appreciably affect the room temperature tensile strength. Injection times from 1 to 2 min cause no significant change in properties; longer periods are harmful. Predrying the fibers by heating to 600°F for 24 hr before combining them with molten Al is beneficial. A 0.45-in. -diam Al bar reinforced with parallel glass fibers was reduced in thickness about 20% by hot rolling. A composite made by hot pressing glass fibers coated with pure Al showed a room temperature tensile strength of 45,000 psi. Bare C glass fibers produced stronger composites than did E glass fibers, and 14S Al produced a better specimen with C glass than 2S Al. Glass-reinforced Al tubes 1 in. in diameter were made by the vacuum injection technique with 14S Al as a matrix alloy and a single Al-coated filament strand as the reinforcement. (See also PB 162 744)

PB 162 746 $3.60

Owens-Corning Fiberglas Corp. [Granville] Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by Herbert B. Ailes. Quarterly progress rept. no. 7, 15 Mar-15 June 57, on Contract NOrd-15764. 5 July 57, 32p. 3 refs.

DESCRIPTORS: *Heat-resistant materials, *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, Rods, Tubes, Production, Tensile properties, Creep.

An evaluation has been made of several of the major variables in the vacuum injection technique of compositing aluminum and aluminum coated glass fibers. Samples of glass-reinforced aluminum were successfully hot forged at temperatures of 1100°F to 1300°F. Additional creep data reinforces the earlier conclusions that the creep rate of glass-reinforced aluminum is less than 1% of the creep rate of unreinforced aluminum A study of the wetting of several aluminum alloys on fibers of fifty different glasses has shown no glass to be appreciably better than E glass in its ability to be coated by aluminum. Modifications to the Olin-Mathieson centrifugal casting unit have resulted in improved operation. Initial work has begun on a study of the interaction of metals and glass fibers and on a program to develop a glass-reinforced metal that may be used at temperatures above 1000°F. (See also PB 144 282)

PB 162 747 $6.60

Owens-Corning Fiberglas Corp. [Granville] Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by Herbert B. Ailes. Quarterly progress rept. no. 8, 15 June-15 Sep 57, on Contract NOrd-15764. 30 Sep 57, 63p. 2 refs.

DESCRIPTORS: *Heat resistant materials, *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, Rods, Tubes, Cylindrical bodies, Production, Tensile properties.

Contents:
Production of large glass reinforced aluminum cylinders, by Warren H. Kaye. 1 Nov 56-15 Sep 57.

The average compressive ultimate strength of the standard glass-reinforced aluminum composite is 128,000 psi at room temperature. The Olin-Mathieson group has investigated the process variables, materials characteristics, and process dynamics of the centrifugal casting procedure for fabrication of glass-reinforced aluminum tubes. Experiments on combinations of glass fibers with Wood's metal, lead, zinc, and aluminum have indicated that strength degradation increased with increasing temperature at which the glass and molten metal are contacted. Evaluations of the wetting of several aluminum alloys on glasses formulated to assist in wetting indicated several glasses which were somewhat superior to the standard E glass in present use. (See also PB 162 746)

PB 162 748 $4.60

Owens-Corning Fiberglas Corp. [Granville] Ohio. INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by Herbert B. Ailes and A. R. Canady. Quarterly progress rept. no. 9, 15 Sep-15 Dec 57, on Contract NOrd-15764. 5 Jan 58, 49p. 6 refs.

DESCRIPTORS: *Heat resistant materials, *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, Rods, Tubes, Cylindrical bodies, Production, Physical properties.

Contents:
Production of large glass reinforced aluminum cylinders, by Warren H. Kaye. 15 Sep-15 Nov 57.

Copper is being used for preliminary investigation of methods of combining glass fibers and high melting point metals. The variables involved in hot-pressing aluminum coated fibers have been evaluated and the optimum conditions have been established. Tensile strengths of 50,000 psi at room temperature can be consistently duplicated. Glass-reinforced aluminum has been tested by an aircraft component manufacturer as an actuator material operating at 500°F. The electrical resistivity of aluminum is doubled by the addition of as little as 15% glass fibers. A sample of hot-pressed aluminum coated fibers was suspended in a rocket blast at 5800°F. for 4-1/2 seconds without deformation. Wetting studies indicate that titanium nitride is effective in increasing the wettability of glass fibers with molten aluminum. Glass reinforced aluminum tubular shapes as large as 7" I.D. have been made successfully by centrifugal casting and by vacuum injection. (See also PB 162 747)

PB 162 749 $2.60

Owens-Corning Fiberglas Corp. [Granville] Ohio. INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by P. A. Lockwood. Quarterly progress rept. no. 12, 15 Sep-15 Dec 58, on Contract NOrd-15764. [1958] 26p.

DESCRIPTORS: *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, Wires, Tensile properties, Test equipment, Recording devices.

The single fiber tensile tester was completed and a series of tests were started to endeavor to determine the factors influencing the tensile strength of coated fibers. In particular, fiber studies were made to examine the influence of two aluminum coating alloys on various types of glasses and the effect of varying humidity on the strength of coated fibers. The tensile strength of the coated fibers was 20 to 24 per cent of the virgin fiber strength with 1100 Al coating and 17 to 23 per cent for the zinc-cadmium aluminum alloy. When coated fibers were tested in various humidities, it was found that aluminum-coated fibers were 23 percent stronger in 5 per cent relative humidity whereas lead-coated fibers showed only a 1 per cent increase compared to tests at 60 per cent relative humidity. Experiments were made to determine the stress-strain diagrams of glass reinforced metals at one thousand magnification in order to understand variations in the shape of the stress-strain diagrams. (See also PB 144 281)

PB 162 750 $3.60

Owens-Corning Fiberglas Corp. [Granville] Ohio. INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by P. A. Lockwood. Quarterly progress rept. no. 14, 15 June-15 Sep 59, on Contract NOrd-15764. [1959] 37p. 3 refs.

DESCRIPTORS: *Heat resistant materials, *Compsoite materials, Glass, Metals, *Glass textiles, *Aluminum, Rods, Structural parts, Tensile properties.

Contents:
Behavior of composite bars as structural elements, by Edward Saibel and Iradj Tadjbakhsh

Variables in the fiber forming and metal coating process thought to affect the tensile strength of the coated glass fibers were reinvestigated with the object of either turning up new information or verifying earlier findings. In the main the earlier results were verified. Stress-strain diagrams were taken at room and elevated temperatures on specimens composited of 4 per cent by volume unoriented "E" glass fibers in 1100 aluminum matrix, 20 per cent "E" glass fibers by volume parallel oriented in 1100 aluminum, and 20 per cent by volume "E" glass fibers parallel oriented in 4032 aluminum. The effect of hot rolling on strength of composite bars containing 50 per cent "E" glass by volume prepared by hot pressing was studied. The influence of high modulus glass versus "E" glass reinforcement on strength of composites was also investigated.

PB 162 751 $2.60

Owens-Corning Fiberglas Corp. [Granville] Ohio. INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by P. A. Lockwood. Quarterly progress rept. no. 15, 15 Sep-15 Dec 59, on Contract NOrd-15764. [1959] 30p.

DESCRIPTORS: *Heat resistant materials, *Compsoite materials, Glass, Metals, *Glass textiles, *Aluminum, *Stainless steel, Rods, Tensile properties, Statistical analysis.

Contents:
The Poisson's ratio of composite materials, by Edward Saibel and I. Tadjbakhsh.

The X-994 glass was formed at over 3100°F and had an average tensile strength in the uncoated condition of 635,000 psi and a tensile strength of 178,000 psi coated with aluminum, roughly 50,000 psi greater than the tensile strength of aluminum-coated "E" glass fibers. A previously outlined experiment was initiated with the object of determining if aluminum coated high temperature fibers showing higher strengths than "E" glass aluminum-coated fibers would yield stronger glass-aluminum composites. Strong fairly coherent green composites of crystalline fibers and -325 mesh stainless steel powder were made by hot pressing at 1000°F and 25 tons per square inch. (See also PB 162 750)

PB 162 752 $2.60

Owens-Corning Fiberglas Corp., Granville, Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS, by P. A. Lockwood. Quarterly progress rept. no. 16, 15 Dec 59-30 Apr 60, on Contract NOrd-15764. 5 Aug 60, 23p. 1 ref. Rept. no. BAR-PL-60-10.

DESCRIPTORS: *Heat resistant materials, *Composite materials, Glass, Metals, *Glass textiles, *Aluminum, *Stainless steel, Production, Tensile properties, Hardness.

Work on hot pressing, slip casting, and low pressure extrusion techniques for making green composites of powdered stainless steel and glass or crystalline fibers is reported. Compacts of high density obtained by hot pressing and slip casting were successfully sintered in hydrogen. Hot pressed compacts sintered in an alumina carbon environment were extremely hard - carbide formation is suspected. The extrusion method was dropped from further consideration as unworkable. Preliminary tensile and stress rupture strengths are reported; they do not reflect the full capabilities of the composite materials. (Author) (See also PB 162 751)

PB 162 696 $1.60

Snell, Foster D., Inc., New York.
IMPROVED DE-ICING MATERIAL FOR USE IN NAVAL AIRCRAFT, by N. L. Hewitt and J. Mitchell Fain. Rept. no. 2 on Contract NOa(S) 10579. 1 Mar 50, 15p; ATI-140 077.

DESCRIPTORS: Naval aircraft, *De-icing materials, Glycols, Ethylenes, Surface-active substances, Alcohols, Ammonia, *Corrosion research.

PB 162 692 $1.60

Westinghouse Electric Corp., Elmira, N. Y.
TRANSPARENT PHOSPHOR DEVELOPMENT, by B. M. Brinton. Quarterly rept. 11 May-15 Aug 59, on Contract NObsr-77582. 20 Aug 59, 16p. 32 refs, AD-225 153.

DESCRIPTORS: *Cathode ray tube screens, *Fluorescent screens, *Phosphors, Display systems, Zinc compounds, Borates, Fluorides, Magnesium compounds, Vapor plating.

Phase I of this contract is to consist of research directed toward the development of transparent cathodoluminescent phosphors with long persistence meeting the following requirements: (1) persistence approximate that of standard P_7 cathode-ray tube screen. (2) capable of being prepared at temperatures which will permit the use of soft glass, (3) capable of being deposited directly on the faceplate of the cathode-ray tube without crazing, cracking, or peeling; and (4) sufficient contrast to make the resultant display significantly superior to displays on cathode-ray tubes with settled screens. Although not mentioned as a specific requirement it is desirable that the emission color be yellow, orange, or red. Requirement (4) means that the screen should have sufficiently high output and sufficiently low reflectivity for incident light to result in improved ambient contrast between excited and unexcited areas. If the transmission of the screen is high enough (reflectivity low enough) this may be achieved even if the inherent efficiency of light production in the screen is below that of conventional powder phosphors. (Author)

Ceramics and Refractories

TID-17227 $4.60

Bausch and Lomb Inc., Rochester, N. Y.
IRRADIATION DAMAGE TO GLASS, by Joseph A. Aboaf, J. Raymond Hensler and others. Rept. on Contract AT(30-1)1312. Oct 62, 46p. 34 refs.

BNL-6355 $4.60

Brookhaven National Lab., Upton, N. Y.
THE INTENTIONAL USE OF ANTIMONY AND MANGANESE IN ANCIENT GLASSES, by Edward V. Sayre. 13 Nov 62, 45p. 12 refs.

RFP-285 $0.50

Dow Chemical Co., Denver, Colo.
DURABILITY TESTS ON PYREX RASCHIG RINGS, by C. L. Schuske and H. W. King. Rept. on Contract AT(29-1)-1106. 26 Oct 62, 7p.

PB 162 699 $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
INVESTIGATION AND EVALUATION OF AVAILABLE HYPERSONIC PROBE MATERIALS AND OXIDATION-RESISTANT COATINGS FOR POSSIBLE USE AT 4000° F FOR 60 SECONDS, by Domenic J. Molella. Dec 59, 39p. 4 refs. Technical memo. no. ME-5-59; AD-240 344.

DESCRIPTORS: Space environmental conditions, Heat resistant alloys, *Refractory materials, Ceramic materials, Cermets, *Ceramic coatings, Molybdenum, Tungsten, Rhenium, *Metal coatings, *Refractory coatings, Graphite, Erosion, Oxidation, *Hypersonic test vehicles.

The materials evaluated on experimental hypersonic probes which were tested with plasma arcs included uncoated, unalloyed Mo (I); uncoated graphite (II); uncoated, unalloyed W (III); uncoated tungsten carbide with a Co binder (IV); uncoated, self-bonded SiC (V); uncoated Fansteel 82 alloy (Nb-Ta-Zr) (VI); 8 oxidation-resistant coatings on Mo (VII) and 2 oxidation-resistant coatings on graphite (VIII). Other materials considered were Ta, Nb, Re and refractory oxides, carbides, nitrides, borides, and silicides. Of the VII coatings, the one showing least damage was a flame-sprayed cermet

(90%W, 10% ZrO_2); another flame-sprayed coating (ZrB_2) attained the highest surface temperature (4400°) and protected the metal against catastrophic damage. I, IV, and VI are not suitable as the Mo oxidized catastrophically and the other 2 materials showed signs of melting when tested. The VIII graphite coatings showed slight erosion and ablation after heat tests.

GEMP-16A $0.75

General Electric Co., Cincinnati, Ohio.
HIGH TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 16, Part A, on Contract AT(40-1)-2847. 15 Oct 62, 32p. 32 refs.

TID-15452 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
CRUSHING STRENGTH DETERMINATION OF ROUNDED CERAMIC PARTICLES, by R. E. Mistler, A. T. Muccigrosso, and F. W. Wiesinger. Rept. on Contract W31-109-eng-52. 23 Apr 62, 19p. 1 ref.

GEAP-3909 $1.00

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
RARE EARTH OXIDES AND RARE EARTH BORATES-CORROSION, COMPATIBILITY, AND RADIATION EFFECTS, by E. W. Hoyt, W. V. Cummings and others. Rept. on Contract AT (04-3)189. 17 Apr 62, 41p. 12 refs. NASA N62-17441.

Fuels, Lubricants, and Hydraulic Fluids

NASA N63-11616 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
RELATIVE IGNITABILITY OF TYPICAL SOLID PROPELLANTS WITH CHLORINE TRIFLUORIDE, by Harrison Allen, Jr. and Murray L. Pinns. Jan 63, 24p. 2 refs. Technical note D-1533.

PB 162 697 $6.60

Petroleum Refining Lab., Pennsylvania State [U., University Park.]
THE DEVELOPMENT OF LESS INFLAMMABLE TYPES OF HYDRAULIC FLUIDS, by Merrell R. Fenske. Rept. on Contract NOrd-7958(B). 30 Apr 48, Rept. no. PRL 3.41.

DESCRIPTORS: *Hydraulic fluids, Flamibility, Tests, Halogen compounds, Benzenes, Butadienes, Propanes, Rubber, Pumps, Lubrication.

This report relates to the use of certain halogenated compounds to reduce the inflammability of the overall fluid, which may contain up to 50 weight per cent of combustible materials. A fluid of this type, which is compatible with the current hydrocarbon-base hydraulic fluids as well as the materials of construction and the parts of present hydraulic systems, is being considered as an interim less inflammable hydraulic fluid. Ultimately, a totally non-inflammable fluid is desired. Fluids of this latter type may necessitate changes in the design and in the materials of construction of hydraulic systems.

PB 162 698 $7.60

Petroleum Refining Lab., Pennsylvania State [U., University Park.]
FLUIDS, LUBRICANTS, FUELS AND RELATED MATERIALS. Progress rept. (Final). July-Sep 51, on Contract NOrd 7958(B). 25 Oct 51, 78p. Rept. no. PRL 2.62.

DESCRIPTORS: *Lubricants, *Fuels, Fluids, Materials, *Hydraulic fluids, Oils, Preparation, Tests, Additives, Polymers, Oxidation, Deterioration, Seals.

As a result of this work Specifications MIL-L-6387, Lubricating Oil, Synthetic Base; MIL-F-5602, Shear Stability Reference Fluid; 51-F-24 (Ord) Ester-Base Damping Fluid; and MIL-F-7197, Rubber Swelling Fluid have been issued. In addition, suggestions for a specification covering a synthetic turbo-prop gear lube and a thin film oxidation and corrosion test are currently being prepared. A test technique developed by this Laboratory to evaluate cloud intensity in low temperature storage tests for hydraulic fluids has been incorporated into Federal Spec. VV-L-791d, test method 20.2.

MATHEMATICS

WAPD-T-1531 $1.10

Bettis Atomic Power Lab., Pittsburgh, Pa.
A MEAN SQUARE DISCRETIZATION ERROR ESTIMATE, by R. B. Kellogg. Rept. on Contract AT(11-1)GEN-14. July 62, 4p. 3 refs.

PPAD-473E $2.60

Frick Chemical Lab., Princeton U., N. J.
TRANSFORMATIONS OF TWO-DIMENSIONAL DATA, by T. Darrah Thomas (Brookhaven National Lab.) and Walter M. Gibson (Bell Telephone Labs.). Rept. on Contract AT(30-1)2137. 18 Oct 62, 25p. 4 refs.

AD-264 884 $3.60

Missouri U. [Columbia].
ON THE RANGE OF THE DIFFERENCE BETWEEN A HYPOTHETICAL DISTRIBUTION FUNCTION AND PYKE'S MODIFIED EMPIRIC DISTRIBUTION FUNCTION, by H. D. Brunk. Rept. on Contract AF 49(638)754. [1961] 36p. 12 refs. AFOSR 1050.

DESCRIPTORS: *Statistical analysis, Theory, *Statistical functions, Statistical distributions, Probability, Sampling.

The statistic studied in this paper may be used in situations in which Kolmogorov's might also be used, to provice a test of the hypothesis that a population has a prescribed distribution function. (Author)

AD-264 875 $2.60

Ohio State U. Research Foundation, Columbus.
BERGMAN OPERATORS FOR THE THREE- AND FOUR- DIMENSIONAL LAPLACE EQUATIONS, by Erwin Kreyszig. Rept. on Contract AF 49(638)362. Aug 61, 24p. 9 refs. RF Proj. 812; AFOSR-490.

DESCRIPTORS: *Operators (Mathematics), *Partial differential equations, Theory, Functions, Equations, Integral equations, Harmonic analysis, Besselfunctions, Polynomials, Complex variables.

The function theoretical approach to elliptic partial differential equations, as developed by Bergman and others, leads to a general characterization of various basic properties of the corresponding solutions and may be regarded as a "translation principle" of results in complex analysis into theorems about those solutions. The basic tool in this approach is Bergman integral operators which transform complex analytic functions into solutions of the differential equations. The present paper will be concerned with harmonic functions of three and four real variables.

SCR-314 $1.60

Sandia Corp., Albuquerque, N. Mex.
COMPUTER ANALYSIS OF GAGE DATA, by J. D. Gilson. Nov 62, 13p.

Computing Devices

HW-63501 $8.10

Hanford Atomic Products Operation, Richland, Wash.
OPERATION AND CIRCUIT DESCRIPTION OF THE CALCINER CONTROL PROGRAMMER, by N. P. Wilburn. Rept. on Contract AT(45-1)1350. Jan 60, 85p

TID-14150 $1.10

Institute for Cancer Research, Philadelphia, Pa.
LOGARITHMIC CONVERTER AND INTEGRATOR, by J. L. Engle. 6 Nov 61, 4p.

LADC-5539 $2.60

Los Alamos Scientific Lab., N. Mex.
MULTIPARAMETER ANALYZERS AT THE LOS ALAMOS SCIENTIFIC LABORATORY: EQUIPMENT AND TECHNIQUES FOR DATA REDUCTION AND ANALYSIS, by R. H. Moore. Rept. on Contract W7405-eng-36. [1962] 29p. 12 refs.

MECHANICS

ORNL-TM-166 $2.60

Oak Ridge National Lab., Tenn.
COLLAPSE OF TUBES BY EXTERNAL PRESSURE, by C. R. Kennedy and J. T. Venard. Rept. on Contract W7405-eng-26. 17 Apr 62, 30p. 10 refs.

Aerodynamics and Pneumatics

NASA N63-11617 $1.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AERODYNAMIC CHARACTERISTICS IN GROUND EFFECT OF A LARGE-SCALE MODEL WITH A HIGH DISK-LOADING LIFTING FAN MOUNTED IN THE FUSELAGE, by Richard A. deSavigny and David H. Hickey. Jan 63, 52p. 5 refs. Technical note D-1557.

LAMS-2770 $0.50

Los Alamos Scientific Lab., N. Mex.
RISE THROUGH THE ATMOSPHERE OF A HOT BUBBLE, by Francis H. Harlow and Billy D. Meixner. Rept. on Contract W-7405-eng-36. Oct 62, 16p. 1 ref. NASA N63-10465.

AD-275 914 $3.60

Naval Ordnance Lab., White Oak, Md.
EFFECT OF VELOCITY AND TEMPERATURE FLUCTUATIONS ON PITOT PROBE MEASUREMENTS IN COMPRESSIBLE FLOW, by James E. Danberg. 30 Jan 62 37p. 9 refs. Aero-ballistic Research rept. no. 151; NOLTR 61-28; NASA N62-12204.

DESCRIPTORS: *Fluid mechanics, *Pitot tubes, *Compressible flow, *Boundary layer, Temperature, Velocity, Pressure, Measurement, Mach number, Heat transfer, Fluid flow.

The effect of velocity and temperature fluctuations on the pressure indicated by a Pitot probe has been analyzed for the compressible case assuming negligible static pressure fluctuations. The results of the analysis show that the velocity fluctuations directly and also via the temperature fluctuations, cause the indicated Pitot pressure to be greater than the Pitot pressure associated with the time average velocity and temperature. Velocity fluctuations cause an increase in the Pitot pressure in proportion to the mean of the square of the fluctuation as is already known for incompressible flow. The role of the temperature fluctuations is to increase the effect of the velocity fluctuations on the measured pressure. Heat transfer into the wall, acting through the temperature fluctuations, has a reverse effect. (Author)

PB 162 734 $3.60

Naval Ordnance Lab., White Oak, Md.
AN IMPROVED METHOD FOR THE TRANSITION REGIME IN RAREFIED GAS FLOWS AND ITS APPLICATION TO THE LINEARIZED PLANE COUETTE FLOW, by S. F. Shen. 31 Dec 61, 31p. 11 refs. Rept. no. NOLTR 61-68; NASA N62-11365.

DESCRIPTORS: *Superaerodynamics, Gas flow, Kinetic theory, *Couette flow, Numerical analysis, Statistical functions, Differential equations, Drag.

For approximate calculations in the transition regime of rarefied gas flows, when the Knudsen number is of order unity, it is proposed to use a new interpolation model for the distribution function. The errors of the proposed distribution function as a solution of the Boltzmann equation are to be controlled by the usual "transfer" equations approach. The new model has the apparent advantage that the correct limiting behaviors in the free molecule and Navier Stokes regimes are assured, and that it exhibits explicity, though perhaps only roughly, some collision effects. On these accounts, the model should be an improvement over the ones used by previous investigators in the same general direction. As an example, the linearized Couette flow has been worked out and the results compared against the iterated solution of Willis and the "two-stream Maxwellian" solution of Lees. (Author)

PB 162 740 $3.60

Naval Ordnance Test Station, China Lake, Calif.
AERODYNAMIC DERIVATIVES FOR AN OSCILLATING RECTANGULAR AIRFOIL AT SUPERSONIC SPEEDS, by John W. Miles, Irven Naiman, and G. M. Schroedter 6 Mar 51, 34p. 7 refs. NAVORD rept. 1292; NOTS 362.

DESCRIPTORS: *Aerodynamic configurations, Airfoils, *Supersonic airfoils, *Wings, *Ailerons, Lift, Moment, Mach number, *Aspect ratio.

The results of two previous papers on the oscillating rectangular wing and aileron provide the basis for this study. The aerodynamic derivatives giving the lift and moment due to plunging and pitching of the wing are formulated in terms of corrections on the two-dimensional results, and these corrections are computed and plotted. The derivatives specifying the hinge moment on the ailerons due to the motion of the wing and the forces due to aileron motion are expressed in terms of the derivatives for the wing alone. (Author)

PB 162 739 $1.60

Naval Ordnance Test Station [China Lake] Calif.
THE INDICIAL ADMITTANCE OF A SUPERSONIC RECTANGULAR AIRFOIL, by James W. Miles. 21 July 49, 18p. 6 refs. NAVORD rept. 1171; NOTS 227.

DESCRIPTORS: *Aerodynamic configurations, Airfoils, *Supersonic airfoils, *Angle of attack, Lift, Moments, Gust loads.

The results of earlier papers are used to calculate the lift and moment coefficients for a rectangular airfoil which experiences a sudden change in angle of attack in an otherwise uniform supersonic stream or which enters a sharp-edged gust. The results are valid when the Mach lines from the leading-edge corners do not intersect the opposite side edges. Numerical results are given in the form of curves. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

PB 162 742 $10.10

David Taylor Model Basin, Washington, D. C.
FREE-STREAM CHARACTERISTICS OF A FAMILY OF LOW-ASPECT-RATIO, ALL-MOVABLE CONTROL SURFACES FOR APPLICATION TO SHIP DESIGN, by L. Folger Whicker and Leo F. Fehlner. Rev. edition, Dec 58, 128p. 19 refs. Rept. 933.

DESCRIPTORS: *Control surfaces, Design, *Hydrodynamics, Aspect ratio, *Ships, Design.

The free-stream characteristics of a family of low-aspect-ratio, all-movable control surfaces are presented. These characteristics-i.e., force and moment coefficients, and chordwise and spanwise center of pressure locations-are plotted as functions of the angle of attack for each surface at various Reynolds numbers in both the ahead and the astern conditions. Investigations were made of the following: three aspect ratios 1, 2, and 3; five section shapes (NACA 0015, Navy Standard Strut, TMB-EPH, TMB Fairing No. 7, and TMB-No. 07507515); two tip shapes, faired and square; and three sweep angles (-8, 0, 11). Cross-plots were made to assess the effects of these parameters, and semi-empirical equations for the force and moment coefficients suitable for design applications are presented. Also included is a design technique for computing the control surface shaft torque. (Author)

PB 162 741 $22.50

David Taylor Model Basin, Washington, D. C.
SYMPOSIUM ON SHIP MANEUVERABILITY [NO. 1], DAVID TAYLOR MODEL BASIN, 24 AND 25 MAY 1960. Oct 60, 449p. 160 refs. Rept. 1461.

DESCRIPTORS: *Symposia, *Ships, *Maneuverability.

The symposium was motivated by the recent upsurge in importance of the subject to both the United States Navy and commercial shipping interests. In addition there has been a rapid growth in laboratories having capabilities for doing research and development work in this area. It is hoped that the symposium will serve to coordinate and supplement the fund of scientific information in a field of endeavor in which there are so few published works other than classified or proprietary reports. (Author)

UCRL-6919 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
A COMPUTER PROGRAM FOR CALCULATING ONE-DIMENSIONAL HYDRODYNAMIC FLOW: KO CODE, by Mark Wilkins, John French, and R. Giroux. Rept. on Contract W7405-eng-48. 2 July 62, 22p. 2 refs.

UCRL-6400 $9.10

Lawrence Radiation Lab., U. of California, Livermore.
THEORIES OF LIQUID VISCOSITY, by Stephen G. Brush. Rept. on Contract W7405-eng-48. 30 June 61, 110p. 553 refs.

K-1531 $2.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
A GENERALIZED CRITERION FOR THE LAMINAR-TURBULENT TRANSITION IN THE FLOW OF FLUIDS, by Richard W. Hanks. Rept. on Contract W-7405-eng-26. 19 Nov 62, 134p. 47 refs. NASA N63-10357.

TID-14354 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
THE ISOTHERMAL TRANSITION FROM LAMINAR TO TURBULENT FLOW OF FLUIDS IN PIPES, CONCENTRIC ANNULI, AND PARALLEL PLATES, by Richard W. Hanks. Rept. on Contract W7405-eng-26 22 Nov 61, 18p. 12 refs.

PB 162 652 $8.60

Utah U. [Salt Lake City.]
TAYLOR EXPANSIONS OF THE HYDRODYNAMIC EQUATIONS, PART II, by Keith L. McDonald. Technical rept. 16 Oct 62, 91p. 31 refs. NASA N63-10566.

DESCRIPTORS: *Hydrodynamics, Fluid mechanics, Fluid dynamics, Pressure, Density, Velocity, *Differential equations, Partial differential equations, Vector analysis, Equations of motion, *Taylor series, Thermodynamics, Electromagnetic fields, Magnetohydrodynamics.

A theoretical investigation is presented of classical hydrodynamics and of electrodynamics (for the most part) of stationary media. The context treats primarily the Taylor expansions of the relevant differential equations, it being a continuation of a previous technical report published by the Brigham Young University in November of 1960. Again the topology of vector fields is emphasized and further properties of vector singular points and nodal points are established. The classical equations of motion are written in the case of arbitrarily accelerated reference frames and the covariance of the geometrical forces is demonstrated. The translational thermal--energy equation is added to the defining differential equations. (Author) (See also PB 153 222)

METALLURGY

USBM-U-978 $0.50

Albany Metallurgy Research Center, Ore.
METALLURGICAL PROGRESS REPORT. Quarterly progress rept. no. 16, 1 July-30 Sep 62, on Contract AT(11-1)-599. 17p. NASA N62-17548.

ANL-6431 $1.00

Argonne National Lab., Ill.
IRRADIATION BEHAVIOR OF RESTRAINED AND VENTED URANIUM-2 w/o ZIRCONIUM ALLOY, by J. A. Horak, J. H. Kittel, and F. L. Yaggee. Rept. on Contract W-31-109-eng-38. June 62, 39p. 21 refs.

BNL-6338 $2.60

Brookhaven National Lab., Upton, N. Y.
OXIDATION AND DISLOCATION MECHANISM IN FATIGUE CRACK FORMATION, by F. E. Fujita. 9 Nov 62, 24p. 16 refs.

GAT-Z-4115 $1.00

Doehler-Jarvis Co., Toledo, Ohio.
DIE CASTING OF COMPRESSOR BLADES, by G. F. Hodgson. Final rept. on Contract AT(33-2)-1. 15 May 62, 41p. Rept. no. 62-5.

HW-SA-2805 $1.10

Hanford Atomic Products Operation, Richland, Wash.
AUTOMATIC PROCESSING OF MECHANICAL PROPERTIES DATA, by A. L. Bement. Rept. on Contract AT(45-1)1350. 9 Nov 62, 10p.

HW-74339 $2.00

Hanford Atomic Products Operation, Richland, Wash.
IMPACT TESTING AND SLOW NOTCH-BEND TESTING OF ZIRCALOY-2, by R. L. Call. Rept. on Contract AT(45-1)-1350. 17 July 62, 80p. 23 refs. NASA N62-17974.

HW-73318 $1.25

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM METALLURGY OPERATION. Quarterly progress rept. Jan-Mar 62, on Contract AT(45-1)-1350. 16 Apr 62, 50p. 9 refs.

HW-74802 $0.75

Hanford Atomic Products Operation, Richland, Wash.
THE PLUTONIUM-OXYGEN SYSTEM, by T. D. Chikalla, C. E. McNeilly, and R. E. Skavdahl. Rept. on Contract AT(45-1)-1350. Sep 62, 25p. 24 refs. NASA N62-18030.

HW-75125 $0.50

Hanford Atomic Products Operation, Richland, Wash.
THERMAL EXPANSION OF PLUTONIUM NITRIDE, by D. F. Carroll. Rept. on Contract AT(45-1)-1350. 2 Oct 62, 8p. 3 refs.

KAPL-2221 $1.00

Knolls Atomic Power Lab., Schenectady, N. Y.
EFFECT OF HYDROGEN ON THE STRAIN FATIGUE PROPERTIES OF ZIRCALOY-2 WELD METAL, by S. Beitscher. Rept. on Contract W-31-109-eng-52. 26 Apr 62, 28p. 8 refs.

UCRL-10457 $1.75

Lawrence Radiation Lab., U. of California, Berkeley.
ANALYSIS OF ENHANCED DIFFUSIVITY IN NICKEL, by Ahmed Rassem Wazzan. Doctoral thesis. Rept. on Contract W-7405-eng-48. Aug 62, 70p. 29 refs.

UCRL-6431 $7.60

Lawrence Radiation Lab., U of California; Livermore.
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NUCLEAR ENGINEERING DEPARTMENT. Progress rept. 1 Jan-30 Apr 62. 106p. Sep 62.

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METALLIC FUEL ELEMENT MATERIALS, by R. C. Lever. Comprehensive technical rept. on General Electric Direct-Air-Cycle, Aircraft Nuclear Propulsion Program, Contracts AF33(600)-38062 and AT(11-1)-171. 20 June 62, 165p. 80 refs. NASA N63-10157.

TID-17265 $4.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
DEVELOPMENT OF SEPARATION PROCEDURES FOR RADIOACTIVE MATERIALS, by Robert J. Klett. Quarterly technical status rept. no. 10, 1 Apr-30 June 62. Rept. on Contract AT(38-1)202. 10 July 62, 46p.

TID-17264 $1.10

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
DEVELOPMENT OF SEPARATION PROCEDURES FOR RADIOACTIVE MATERIALS, by Robert J. Klett. Quarterly technical status rept. no. 11, 1 July-30 Sep 62, on Contract AT(38-1)-202. 26 Nov 62, 8p.

HW-74333 $1.00

Hanford Atomic Products Operation, Richland, Wash. COOLANT CHEMISTRY INSTRUMENTATION STUDIES FOR PRESSURIZED WATER REACTORS: WET CHEMICAL ANALYSES, by T. F. Demmitt. Rept. on Contract AT(45-1)-1350. 30 July 62, 37p. 7 refs.

HW-SA-2750 $3.60

Hanford Atomic Products Operation, Richland, Wash. CRITICALITY AND NUCLEAR SAFETY OF SLIGHTLY ENRICHED URANIUM, by E. D. Clayton and C. L. Brown. Rept. on Contract AT(45-1)1350. 11 Sep 62, 39p. 22 refs.

HW-48861 TH $8.10

Hanford Atomic Products Operation, Richland, Wash. DETERMINATION OF TIME DISPLACEMENT CURVES FOR VERTICAL SAFETY RODS, by Gentry Everett Wade. Master's thesis. Rept. on Contract AT(45-1)1350. 1 Apr 57, 89p. 14 refs.

HW-68420(Rev.) $2.75

Hanford Atomic Products Operation, Richland, Wash. ECONOMIC EVALUATION OF A 300-Mw(e) SUPERCRITICAL PRESSURE POWER REACTOR, by H. Harty, J. J. Regimbal and others. Rept. on Contract AT(45-1)-1350. June 61, 174p. 26 refs.

HW-SA-2778 $1.60

Hanford Atomic Products Operation, Richland, Wash. FISSION FRAGMENT AND PLUTONIUM MIGRATION IN URANIUM DIOXIDE FUEL, by J. L. Bates, J. A. Christensen, and W. E. Roake. Rept. on Contract AT(45-1)1350. 12p. 7 refs.

HW-SA-2689 $3.60

Hanford Atomic Products Operation, Richland, Wash. HANFORD PROGRAMS FOR ADVANCED PLUTONIUM FUEL DESIGNS AND FABRICATION METHODS, by E. A. Evans. Rept. on Contract AT(45-1)1350. 9 Nov 62, 39p. 14 refs.

HW-74287 $0.50

Hanford Atomic Products Operation, Richland, Wash. HEAD-WELDED SWAGEABLE END CAP FOR UO_2-PuO_2 FUEL ELEMENTS, by L. C. Lemon and W. T. Ross. Rept. on Contract AT(45-1)-1350. 13 July 62, 14p. 3 refs.

HW-SA-2757 $2.60

Hanford Atomic Products Operation, Richland, Wash. HIGH ENERGY IMPACT FORMING OF CERAMIC FUELS, by D. W. Brite. Rept. on Contract AT(45-1)1350. 22 Nov 62, 21p.

HW-73859(rev.) $0.50

Hanford Atomic Products Operation, Richland, Wash. LOCALIZED OXIDATION IN NUCLEAR GRAPHITES, by B. A. Ryan. Rept. on Contract AT(45-1)-1350. 14 Aug 62, 19p. 10 refs.

HW-71521 $1.60

Hanford Atomic Products Operation, Richland, Wash. MEASUREMENT OF CYLINDRICAL SHAPES, by Kenneth R. Merckx. Rept. on Contract AT(45-1)1350. 10 Nov 61, 17p.

HW-SA-2629 $1.60

Hanford Atomic Products Operation, Richland, Wash. MANAGEMENT OF RADIOACTIVE EFFLUENT GASES AT HANFORD ATOMIC PRODUCTS OPERATION, by J. K. Soldat. Rept. on Contract AT(45-1)1350. 13 Nov 62, 12p. 20 refs.

HW-74429 $2.00

Hanford Atomic Products Operation, Richland, Wash. PAPERS AND PROCEEDINGS OF THE X-RAY PREFERRED ORIENTATION MEETING HELD AT HAPO, JUNE 29 AND 30, 1961, ed. by W. Gary Jolley. Rept. on Contract AT(45-1)-1350. Aug 62, 79p. 5 refs.

HW-SA-2680 $2.60

Hanford Atomic Products Operation, Richland, Wash. PLUTONIUM FUEL EXPERIENCE AT HANFORD, by I. D. Thomas. Rept. on Contract AT(45-1)1350. 6 Sep 62, 23p. 20 refs.

HW-69200(Pt. I) $1.75

Hanford Atomic Products Operation, Richland, Wash. PLUTONIUM SPIKE FUEL ELEMENTS FOR THE PRTR. PART I. THE MARK I-G, by M. D. Freshley. Rept. on Contract AT(45-1)-1350. Mar 61, 64p. 30 refs.

HW-SA-2801 $2.60

Hanford Atomic Products Operation, Richland, Wash. A PROGRAM TO ESTIMATE MEASUREMENT ERROR IN NONDESTRUCTIVE EVALUATION OF REACTOR FUEL ELEMENT QUALITY, by J. L. Jaech. Rept. on Contract AT(45-1)1350. 10 Oct 62, 43p.

HW-SA-2783 $1.60

Hanford Atomic Products Operation, Richland, Wash.
QUALITY CONTROL IN REACTOR FUEL ELEMENT MANUFACTURING, by D. E. Munro. Rept. on Contract AT(45-1)1350. 5 Oct 62, 12p.

HW-SA-2711 $5.60

Hanford Atomic Products Operation, Richland, Wash.
A SURVEY OF THE ECONOMICS OF PLUTONIUM AS A FUEL IN THERMAL REACTORS, by E. A. Eschbach. Rept. on Contract AT(45-1)1350. 4 Oct 62, 54p.

HW-71251 $1.60

Hanford Atomic Products Operation, Richland, Wash.
A TECHNIQUE FOR APPRAISAL OF NPR STACK GAS SYSTEMS, by G. E. Zima. Rept. on Contract AT(45-1)1350. 4 Oct 61, 15p.

HW-72802 $2.00

Hanford Atomic Products Operation, Richland, Wash.
ULTRASONIC TESTING OF ZIRCALOY SHEATH TUBING FOR FUEL ELEMENTS, by C. E. Fitch, H. E. May, and V. E. Kale. Interim rept. on Contract AT(45-1)-1350. June 62, 84p. 27 refs. NASA N62-17443.

HASL-124 $0.75

Health and Safety Lab., Atomic Energy Commission, New York.
EFFECTIVE MULTIPLICATION FACTORS FOR BARE CYLINDERS, by Stephen J. Lanes. May 62, 25p. 4 refs.

KAPL-2000-19 $2.25

Knolls Atomic Power Lab., Schenectady, N. Y.
CHEMISTRY. Reactor technology rept. no. 22, on Contract W-31-109-eng-52. Sep 62, 98p. 34 refs.

UCRL-6980 $0.50

Lawrence Radiation Lab., U. of California, Livermore
HIGH-TEMPERATURE BARE BeO CRITICAL EXPERIMENTS: GENERAL DESCRIPTION AND PRELIMINARY RESULTS, by Reinald G. Finke. Rept. on Contract W-7405-eng-48. 29 June 62, 23p. NASA N62-17477.

LAMS-2755 $1.60

Los Alamos Acientific Lab., N. Mex.
LEAKAGE NEUTRON SPECTRUM OF U^{233} CRITICAL ASSEMBLY, by Larry E. Bobisud. Rept. on Contract W7405-eng-36. Sep 62, 20p. 7 refs.

LADC-5354 $2.60

Los Alamos Scientific Lab., N. Mex.
NONDESTRUCTIVE INSPECTION OF FUEL ELEMENTS FOR NUCLEAR ROCKETS, by Gerold H. Tenney. Rept. on Contract W7405-eng-36. [1962] 27p. 7 refs.

LADC-5408 $1.60

Los Alamos Scientific Lab., N. Mex.
PLUTONIUM AS A FUEL FOR THE LOS ALAMOS MOLTEN PLUTONIUM REACTOR EXPERIMENT, by D. B. Hall. Rept. on Contract W7405-eng-36. 10 Oct 62, 19p. 6 refs.

NLCO-860 $1.75

National Lead Co. of Ohio, Cincinnati.
SUMMARY TECHNICAL REPORT. Rept. for 1 July-30 Sep 62, on Contract AT(30-1)-1156. 31 Oct 62, 70p. 26 refs.

NUMEC-P-48 $1.10

Nuclear Materials and Equipment Corp., Apollo, Pa.
DEVELOPMENT OF PLUTONIUM-BEARING FUEL MATERIALS. Monthly progress letter for Aug 62, on Contract AT(30-1)2389. 5 Sep 62, 4p. 1 ref.

ORNL-TM-218 $1.60

Oak Ridge National Lab., Tenn.
DEVELOPMENT OF REGENERATIVE COMPRESSOR FOR HELIUM CIRCULATION, I. K. Namba. Rept. on Contract W7405-eng-26. 20 July 62, 20p. 7 refs.

IDO-16799 $2.50

Phillips Petroleum Co., Idaho Falls.
FUEL ELEMENT DEVELOPMENT FOR FY 1962, by G. W. Gibson and W. C. Francis. Annual progress rept. on Contract AT(10-1)-205. 15 Aug 62, 128p. 15 refs.

IDO-16805 $1.50

Phillips Petroleum Co., Idaho Falls.
MATERIALS TESTING REACTOR-ENGINEERING TEST REACTOR TECHNICAL BRANCHES. Quarterly rept. Apr-June 62, on Contract AT(10-1)-205. 14 Sep 62, 63p. 38 refs. NASA N62-17971.

IDO-16801 $0.50

Phillips Petroleum Co., Idaho Falls.
AN OUT-OF-PILE ELECTRON IRRADIATION CIRCULATING LOOP FOR FOULING STUDIES, by R. A. Mengelkamp, P. S. Hudson, and J. C. Hillyer. Rept. on Contract AT(10-1)-1080. 1 Aug 62, 11p. 3 refs.

IDO-16689 $1.50

Phillips Petroleum Co., Idaho Falls.
SPERT IV HAZARDS, by F. L. Bentzen and J. G. Crocker. Summary rept. on Contract AT(10-1)-205. 7 July 61, 67p. 6 refs.

IDO-16806 $1.00

Phillips Petroleum Co., Idaho Falls.
SPERT PROJECT, ed. by F. Schroeder. Quarterly technical rept. Apr-June 62, on Contract AT(10-1)-205. 21 Sep 62, 40p. 11 refs.

SC-4675(RR) $4.00

Sandia Corp., Albuquerque, N. Mex.
20-TON AND 1/2-TON HIGH EXPLOSIVE CRATERING EXPERIMENTS IN BASALT ROCK, ed. by D. F. Rauber. Project Buckboard, Project Plowshare Final rept. Aug 62, 307p.

DP-778 $1.25

Savannah River Lab., Aiken, S. C.
APPLICATION OF ACTIVATED CARBON IN REACTOR CONTAINMENT, by George H. Prigge. Rept. on Contract AT(07-2)-1. Sep 62, 56p. 12 refs.

TID-17231 $1.10

Savannah River Lab., Aiken, S. C.
CALCULATIONS OF THERMAL SPECTRA IN ORGANIC-COOLED, D_2O-MODERATED POWER REACTORS, by H. D. Brown. Rept. on Contract AT(07-2)1. 23 Nov 62, 7p. 3 refs.

DPSPU-62-30-38 $5.60

Savannah River Lab., Aiken, S. C.
MARK VII-A FUEL SLUGS. COMPUTER SURVEILLANCE OF CRYSTALLOGRAPHIC ORIENTATION, by R. S. Wood, Jr. Rept. on Contract AT(07-2)1. Nov 62, 55p. 5 refs.

DP-694 $0.50

Savannah River Lab., Aiken, S. C.
REPAIR OF HEAT EXCHANGERS DAMAGED BY STRESS CORROSION, SAVANNAH RIVER PLANT. Rept. on Contract AT(07-2)-1. Apr 62, 23p. 1 ref.

DP-787 $2.00

Savannah River Lab., Aiken, S. C.
STATUS OF THE UNITED STATES EFFORT IN D_2O REACTOR PHYSICS, by John L. Crandall. Rept. on Contract AT(07-2)-1. Sep 62, 93p. 204 refs.

Y-1396 $2.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
EFFECTS OF MAJOR PARAMETERS ON CYCLE EFFICIENCY AND COST FOR A GAS-COOLED REACTOR TURBINE POWER PLANT, by R. V. Miskell. Rept. on Contract W-7405-eng-26. 19 June 62, 131p. 11 refs.

WCAP-1373 $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
REVISION OF THE STORAGE OF NUCLEAR FUEL AT THE WESTINGHOUSE REACTOR EVALUATION CENTER, by R. J. French. 31 Dec 59, 13p. 10 refs.

Nuclear Reactions

ANL-6551 $0.75

Argonne National Lab., Ill.
A PROCEDURE FOR THE EVALUATION OF NEUTRON-SCATTERING CROSS SECTION IN THE INCOHERENT APPROXIMATION, by V. Z. Jankus. Rept. on Contract W-31-109-eng-38. Sep 62, 29p. 13 refs.

TID-16949 $15.30

Arkansas U., Fayetteville.
RARE NUCLEAR REACTIONS INDUCED BY 14.8 MeV NEUTRONS, by Edward Turner Bramlitt. Doctoral thesis. 1963, 228p. 192 refs.

WASH-1039 $1.25

Brookhaven National Lab., Upton, N. Y.
REPORTS TO THE AEC NUCLEAR CROSS SECTIONS ADVISORY GROUP, BROOKHAVEN NATIONAL LABORATORY, MAY 14-15, 1962, by John R. Stehn. 44p. 28 refs.

UCRL-10294 $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
CONTROLLED THERMONUCLEAR RESEARCH. Semiannual rept. Jan-June 62, on Contract W-7405-eng-48. 20 July 62, 116p. 32 refs. Prepared in cooperation with Lawrence Radiation Lab., U. of California, Livermore; NASA N63-10141.

UCRL-10187 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
NEUTRAL PIONS FROM PROTON-PROTON COLLISIONS AT 735 MeV, by Gilbert D. Mead. Doctoral thesis. Rept. on Contract W-7405-eng-48. 8 May 62, 87p. 39 refs.

UCRL-6690 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
NEUTRON-ACTIVATION CROSS SECTIONS, by J. A. Miskel, K. V. Marsh and others. Rept. on Contract W7405-eng-48. 19 Dec 61, 28p. 34 refs.

Radioactivity

NAA-SR-7650 $0.75

Atomics International, Canoga Park, Calif.
ENVIRONMENTAL MONITORING, by J. D. Moore, W. L. Fisher, and P. A. Rowe. Semiannual rept. 1 Jan-30 June 62, on [Contract AT(11-1)GEN-8]. 30 Nov 62, 28p.

TEI-832 $6.60

Geological Survey, Washington, D. C.
GAMMA-RADIOACTIVITY INVESTIGATIONS AT THE NEVADA TEST SITE, NYE COUNTY, NEVADA, by Carl M. Bunker and Marvin D. Shutler. Interim rept. Feb 60-July 61. Oct 62, 67p. 6 refs.

HW-74398 $0.75

Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF RADIOLOGICAL CONDITIONS IN THE VICINITY OF HANFORD, ed. by J. W. Vanderbeek. Rept. Apr-June 62, on Contract AT(45-1)-1350. 23 July 62, 25p. 3 refs.

PB 162 644 $11.00

Lyman Lab. of Physics, Harvard U., Cambridge.
THE RADIOACTIVITY OF Sb^{125} AND Te^{125M}, by Rocco Sandy Narcisi. Doctoral thesis. Rept. on Contract Nonr-1866(19). Apr 59, 148p. 47 refs. Technical rept. no. 2-9; AD-217 161.

DESCRIPTORS: *Radioactivity, *Antimony, *Tellurium, *Radioactive isotopes, *Gamma rays, Beta-ray spectrum, Spectrum analyzers, Electrons, Nuclear spins, Parity, Nuclear energy levels, *Coincidence counting.

The radioactivity of Sb^{125} (2.4 yr) and Te^{125M} (58 day) was studied with a double-focusing magnetic spectrometer. Prompt γ-γ coincidences in Te^{125} were studied with a NaI scintillation coincidence spectrometer. K conversion intensities, conversion ratios, and properties of the β spectrum were determined by a study of the electrons emitted by a Sb^{125} source. Transition energies were measured absolutely by a comparison with the standard internal conversion lines of ThB. γ-ray transitions and their intensities were determined by examining the secondary electrons ejected by the γ-rays from Th and Ta converter foils. Some high resolution studies on the internal conversion lines of Te^{125M} were made. A consistent level scheme for Te^{125} is proposed on the basis of prompt γ-γ coincidence studies, intensity data, measured internal conversion coefficients, conversion ratios, β-ray end point: ft values, and the measured transition energies. With these measurements, the multipolarity of the transitions and the spins and parities of the nuclear levels in Te^{125} are determined. A comparison of the level scheme of Te^{125} is made with the predictions of several nuclear models. (ASTIA abstract)

Waste Disposal

WAPD-T-1280 $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
EVALUATION OF THE PERFORMANCE OF THE RADIOACTIVE WASTE DISPOSAL SYSTEM AT THE SHIPPINGPORT STATION, by C. S. Abrams, W. J. Hahn, and J. R. LaPointe. Rept. on Contract AT(11-1)GEN-14. May 61, 25p. 7 refs.

KT-530 $1.60

Engineering Practice School, Mass. Inst. of Tech., Oak Ridge, Tenn.
EVAPORATION OF RADIOACTIVE WASTE SOLUTIONS, by J. C. McClymont, Jr., W. R. Alcorn, and J. A. Lauber, Jr. 3 May 60, 20p.

TEI-829 $3.60

Geological Survey, Washington, D. C.
GAMMA-RADIOACTIVITY INVESTIGATIONS RELATED TO WASTE DISPOSAL, JACKASS FLATS, NEVADA TEST SITE, by C. M. Bunker and W. A. Bradley. Sep 62, 37p. 1 ref.

HW-SA-2748 $1.60

Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF DISCHARGING RADIOACTIVE WASTES INTO FRESH WATER STREAMS, by R. B. Hall and R. H. Wilson. Rept. on Contract AT(45-1)1350. 13 Nov 62, 19p. 10 refs.

HW-75290 $1.00

Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT ACTIVITIES. FIXATION OF RADIOACTIVE RESIDUES, ed. by E. R. Irish. Quarterly progress rept. on Contract AT(45-1)-1350. Oct 62, 30p. 10 refs.

IDO-14586 $2.25

Phillips Petroleum Co., Idaho Falls.
DEVELOPMENT OF A FLUIDIZED BED CALCINATION PROCESS FOR ALUMINUM NITRATE WASTES IN A TWO-FOOT-SQUARE PILOT PLANT CALCINER. PART I. EQUIPMENT DEVELOPMENT AND INITIAL PROCESS STUDIES, by B. P. Brown, E. S. Grimmett, and J. A. Buckham. Rept. on Contract AT(10-1)-205. 20 June 62, 121p. 13 refs.

IDO-14587 $0.50

Phillips Petroleum Co., Idaho Falls.
DEVELOPMENT OF A FLUIDIZED BED CALCINATION PROCESS FOR ALUMINUM NITRATE WASTES IN A TWO-FOOT-SQUARE PILOT PLANT CALCINER. PART II: FACTORS AFFECTING THE INTRAPARTICLE POROSITY OF ALUMINA, by B. R. Wheeler E. S. Grimmett and J. A. Buckham. Rept. on Contract AT(10-1)-205. 25 July 62, 28p. 10 refs.

IDO-14581 $0.50

Phillips Petroleum Co., Idaho Falls.
LOW TEMPERATURE POLYMORPHIC TRANSFORMATIONS OF CALCINED ALUMINA, by R. F. Murray and D. W. Rhodes. Rept. on Contract AT(10-1)-205. 28 Sep 62, 28p. 19 refs.

IDO-14592 $0.50

Phillips Petroleum Co., Idaho Falls.
THERMAL CONDUCTIVITY OF ALUMINA PRODUCED BY THE FLUIDIZED BED PROCESS, by Paul N. Kelly. Rept. on Contract AT(10-1)-205. 4 Sep 62, 25p. 13 refs.

IDO-16794 $0.75

Phillips Petroleum Co., Idaho Falls.
VIBRATIONAL ANALYSIS OF UNFIRED HORIZONTAL BAYONET TUBES IN A FLUIDIZED BED CALCINER, by S. D. Anderson and G. W. Hirschi. Rept. on Contract AT(10-1)-205. 19 Oct 62, 34p. 5 refs.

DPSPU-62-30-21B $3.60

Savannah River Lab., Aiken, S. C.
LITHOLOGY AND HYDROLOGY OF RADIOACTIVE WASTE DISPOSAL SITES AT THE SAVANNAH RIVER PLANT, by S. O. Reichert and J. W. Fenimore. Rept. on Contract AT(07-2)1. Oct 62, 37p. 4 refs.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

NASA N63-11740 $1.00

Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Tex.
DEVELOPMENT OF INFLATABLE COMPONENTS OF PERSONAL EQUIPMENT FOR ASTRONAUT BODY INSTRUMENTATION AND SURVIVAL AT SEA, by Matthew I. Radnofsky and Joseph J. Kosmo. Jan 63, 37p. 6 refs. Technical note D-1083.

PHYSICS

TID-13276 $1.60

Argonne National Lab., Ill.
TEMPERATURE DISTRIBUTION IN COUETTE FLOW WITH RADIATION, by R. Viskanta and R. J. Grosh. Rept. on Contract W31-109-eng-38. Apr 61, 11p. 6 refs. UAC-5200.

UCRL-9792 $1.10

Lawrence Radiation Lab., U. of California, Berkeley.
ON CHARGE CONJUGATION, K. M. Case. Rept. on Contract W7405-eng-48. 19 July 61, 9p. 2 refs.

LADC-5445 $1.10

Los Alamos Scientific Lab., N. Mex.
THE MAGNETIC PROPERTIES OF PLUTONIUM HYDRIDE AND DEUTERIDE, by C. E. Olsen, T. A. Sandenaw, and B. T. Matthias. Rept. on Contract W7405-eng-36. [1962] 6p. 5 refs.

LADC-5459 $1.10

Los Alamos Scientific Lab., N. Mex.
PROPOSED NOMENCLATURES FOR THE HELIUM ALLOTROPES, by A. F. Schuch and R. L. Mills. Rept. on Contract W7405-eng-36. Sep 62, 7p. 9 refs.

PB 162 621 $1.60

Optical Communications Lab., Northwestern U., Evanston, Ill.
BIBLIOGRAPHY ON FLASH DISCHARGES 1923-1954, by W. S. Huxford. Special rept. on Contract DA 36-039-sc-42526. 1 June 54, 15p. 91 refs. AD-45 268.

DESCRIPTORS: *Bibliography, Electrical discharges, *Stroboscopes, *High speed photography, *Flash lamps, Electrical properties, Dynamics, Spectrographic analysis, *Plasma physics, Gases, Shock waves.

Contents:
Technical development of stroboscopic flash lamps
Flash lamps for high-speed photography
Electrical and dynamic characteristics
Spectra of flash discharges
Plasma properties and theory
Propagated gaseous discharge pulses (electrically excited shock waves)
(Physics, 5 Apr 63)

AD-280 718 $2.60

Uppsala U. (Sweden).
JUSTIFICATION OF THE ONE-BODY MODEL FOR AN ELECTRON OUTSIDE A "CORE" WITH APPLICATIONS TO LITHIUM AND SODIUM, by Yngve Ohrn and Roy McWeeny (University Coll. of North Staffordshire). Technical note no. 60 on Contract AF 61(052)351. 15 Feb 61, 21p. 10 refs. ARL 246.

DESCRIPTORS: *Quantum mechanics, Valence, *Electrons, Lithium, Sodium, Atoms, Atomic structure, Atomic orbitals, Atomic energy levels, Calculus of variations.

Using a density matrix formalism, an effective Hamiltonian for a valence electron is constructed. The resulting one-electron equation is not subject to any constraints. (Author)

Electronics

PB 162 670 $7.60

Johns Hopkins U. [Baltimore, Md.]
PLASMA DYNAMICS, by Francis H. Clauser. Final rept. (revised copy) on Contract AF 18(600)671. Aug 59, 79p. AFOSR TR-59-125; AD-229 510.

DESCRIPTORS: *Plasma physics, Dynamics, *Magnetohydrodynamics, Gas discharges, Electrons, Fluid mechanics.

This paper explores the one-dimensional, steady flow of a gas consisting of particles all having the same sign of their electrical charge. The question of what dynamical equations govern such a flow is discussed. Then these equations are solved without sacrificing their nonlinear character. The full range of behavior from zero Mach number to infinite Mach number is explored as is the full range of the effect of external electric fields on the flow. It is found that the non-linearity of the equations introduces several fundamental new concepts to fluid mechanics. It is also found that under some conditions a number of radically different flows can exist for exactly the same set of boundary conditions. Under other conditions, no flows whatever exist that fit the boundary conditions. (Author)

PB 162 645 $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MAGNETOHYDRODYNAMICS AND ENERGY CONVERSION. Rept. for period ending 15 Sep 60, on Contracts AF 33(616)3984 and AF 19(604)4551, and National Science Foundation Grant G-9330. 15 Oct 60, 21p. 8 refs. AD-248 728.

DESCRIPTORS: *Magnetohydrodynamics, Energy, Electromagnetic waves, Electromagnetic theory, *Plasma physics, Magnetic fields, Motion, Partial differential equations.

The classical Rayleigh problem can be extended to magnetohydrodynamics by considering the motion caused by the impulsive start, in a direction parallel to itself (the x-axis), of an infinite flat plate (the y equals 0 plane) immersed in an infinite extent of an incompressible, vascous, electrically-conducting fluid initially at rest, with a magnetic field applied over space. In general, the problem can be treated as four cases: the first two, for an infinitely conducting plate of either finite or infinitesimal thickness; the third, for a plate of finite thickness and conductivity; and the fourth, for a nonconducting plate of arbitary thickness, These cases differ in boundary conditions, and the solutions for each are therefore decidedly different. The basic problem considered is that of the nonconducting plate with an applied field that is transverse to the plate and parallel to the +y axis. The problem is of interest because it gives insight into the general character of the flow to be expected in many practical applications, such as flow about obstacles and flow at nonconducting boundaries. (Author)

Molecular Physics and Spectroscopy

TID-17213 $1.60

Argonne National Lab., Ill.
ELECTRON PARAMAGNETIC RESONANCE STUDIES OF TRIPLET STATES AND ENERGY TRANSFER, by B. Smaller and J. R. Remko. Rept. on Contract W31-109-eng-38. 8 Nov 62, 11p. 6 refs.

TID-14894 $1.10

Argonne National Lab., Ill.
PARAMAGNETIC RESONANCE OF FROZEN ARGENTIC (II) ACID SOLUTIONS: COORDINATION OF THE METALLIC ION. Rept. on Contract W31-109-eng-38. Dec 61, 8p. 4 refs. UAC-5896.

TID-17188 $1.10

Argonne National Lab., Ill.
VIBRONIC INTERACTIONS IN METAL-HEXAFLUORIDE MOLECULES, by G. L. Goodman, B. Weinstock and M. Fred. Rept. on Contract W31-109-eng-38. Aug 62, 5p. 11 refs. UAC-6787.

TID-14800 $1.60

Los Alamos Scientific Lab., N. Mex.
A MOLECULAR-ORBITAL APPROACH TO THE DEVELOPMENT OF VIBRATIONAL POTENTIAL FUNCTIONS: STRETCH-STRETCH INTERACTION CONSTANTS FOR METAL HEXACARBONYLS, by Llewellyn H. Jones. Rept. on Contract W7405-eng-36. 8 Feb 62, 13p. 5 refs. LADC-5216.

PB 162 649 $4.60

Northwestern U., Evanston, Ill.
THE ABSORPTION OF WATER VAPOR IN THE REGIONS 1.33 TO 1.48 AND 1.77 TO 1.98 MICRONS, by Richard C. Nelson. Summary rept. no. 4 on Contract NObs-28373. 23 May 49, 46p. 2 refs.

DESCRIPTORS: *Water vapor, Absorption, *Absorption spectra, Spectrographic data, Molecular spectroscopy.

New measurements of the wavelengths of water vapor absorption lines from 1.3 to 2.0μ have been made, using a large grating spectrograph with lead sulfide photoconductive detector. Recorder tracings showing this region at high resolution are included, as well as complete wavelength tables. The number of lines measured has been approximately doubled as compared with those of previous workers, and resolving powers to 0.15 cm^{-1} have been attained. Wave numbers are probably accurate to 0.1 cm^{-1}. (Author)

Optics

AD-273 339 $5.60

Arkansas U., Fayetteville.
STUDIES OF OPTICAL POLARIZATION ELECTRON IMPACT, by R. H. Hughes and O. H. Zinke. Technical rept. on Contract AF 49(638)559. Dec 61, 58p. 20 refs. AFOSR-2259; NASA N62-10522.

DESCRIPTORS: *Optics, *Polarization, *Electrons, *Impact shock, *Helium, Atoms, Excitation, Gases, Kinetic theory, Measurement, Electron optics.

Included in the report is: Modified Wollaston prism for spectral polarization studies, pub. in The Review of Scientific Instruments, 31:1156-1157, Oct 60

An investigation of the polarization of the atomic line radiation induced by electron impact on helium has been undertaken. Experimental data have been obtained on the polarization of several lines as a function of both electron energy and pressure. Secondary excitation processes, such as collision of the second kind and radiative transfer (cascade), are found to play an important role in the polarization. An expression is derived which enables the measurement of gas-kinetic collision cross sections involving atoms in excited states by observing the depolarization as the gas pressure increases. Such cross sections have been determined for some states. The feasibility of the detection of the Lyman alpha radiation from positronium formed through the charge-changing collisions between positions and gas atoms, was investigated. Excitation of nitrogen and rare-gas atoms by beta emission from W185 has been observed. (Author)

UCRL-9726 $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
A PULSED NANOSECOND LIGHT SOURCE, by Thomas G. Innes and Quentin A. Kerns. Rept. on Contract W7405-eng-48. 4 Aug 61, 27p. 7 refs.

AD-286 455 repriced $2.50

Naval Ordnance Lab., White Oak, Md.
LIGHT SCATTERING BY PARTIALLY ABSORBING CYLINDERS-COEFFICIENTS, by Louis F. Libelo. 15 Aug 62, 118p. 9 refs. Rept. no. NOLTR 62-142.

DESCRIPTORS: *Scattering, *Electromagnetic waves, *Refractive index, *Light, *Absorption, Cylindrical bodies, Theory, Tables.

A table of the complex scattering coefficients is presented for the problem of scattering of normally incident, linearly polarized, plane electromagnetic waves by partially absorbing infinite circular cylinders. This table contains the scattering coefficients for the incident plane wave polarized parallel to the cylinder axis and also those for the incident plane wave polarized perpendicular to the cylinder axis.

(Physics--Optics, 5 Apr 63, released 20 Jan 63)

Solid State Physics

TID-17185 $1.60

Argonne National Lab., Ill.
BORN REPULSIVE POTENTIAL IN THE ALKALI HALIDE CRYSTALS, by F. G. Fumi. Rept. on Contract W31-109-eng-38. Aug 62, 14p. 15 refs. Prepared in cooperation with Northwestern U.

ANL-6592 $0.50

Argonne National Lab., Ill.
CRYSTAL GEOMETRY COMPUTER PROGRAM, by Lawrence P. Bush and Lowell T. Lloyd. Rept. on Contract W-31-109-eng-38. Oct 62, 17p. 6 refs.

PB 162 648 $1.60

[Clevite Corp.] Cleveland, Ohio.
[ARTIFICIAL CRYSTALS] by Hans Jaffe. Quarterly progress rept. no. 2 on Contract W28-003-sc-1583. 23 Jan 46, 11p. ATI-31 218.

DESCRIPTORS: Crystals, *Synthetic stones, *Single crystals, *Crystal growth, *Piezoelectric crystals, Potassium compounds, Lithium compounds, Beryllium compounds, Ammonium compounds, Cesium compounds, Sulfates, Borates, Bromates, Tartrates, Arsenates, Nitrates, Nitrogen compounds, Ethylenes.

Efforts were made to grow flawless single crystals of the substances specified. It is planned to produce clear crystal material sufficient to cut several dozen plates and bars extending at least 1 cm in any specified direction of all crystals to be submitted to frequency measurements. Available information on piezoelectric crystals for other crystals which might be promising for frequency control was continued.

PB 162 731 $3.60

[Clevite Corp.] Cleveland, Ohio.
ARTIFICIAL QUARTZ CRYSTALS, by Danforth R. Hale. Quarterly progress rept. no. 6 on Contract W36-039-sc-38190. 15 June 50, 37p. Brush Development rept. no. 398; ATI-86 758.

DESCRIPTORS: Crystals, *Synthetic stones, *Quartz, *Crystal growth, *Crystal oscillators, *Piezoelectric crystals, Lattices, Production, Tests, Pressure vessels, Design, Models (Simulations), Lubricants.

A run of 38 days deposited 2.38 lbs of quartz on 19 seeds, 0.3 lb., most of the product crystals showing no veils over the seeds, and none showing more than an occasional solid inclusion. Individual crystals weighed between 55 and 64. g., and one crystal supported to permit entirely free growth attained 80 g. A larger two-chamber autoclave of 130 liter capacity, has been designed. A glass model two-chamber rocking autoclave made approximately to the scale of Autoclave 32 has demonstrated, by means of a difference in density of the solution in the two chambers, how the exchange of solution occurs between the two chambers. A crystal has been processed into frequency control units at approximately 5 mc in an attempt to meet CR-18 specifications as covered in MIL-C-3098. (See also PB 117 228)

AD-262 724 $9.60

David Sarnoff Research Center, Princeton, N. J.
HEXAGONAL MAGNETIC COMPOUNDS, by Robert L. Harvey, Irwin Gordon, and R. A. Braden. Final rept. 15 Mar 59-15 June 61, on Contract DA 36-039-sc-78288. 15 June 61, 112p. 9 refs. AD-262 724.

DESCRIPTORS: *Ferromagnetic materials, *Crystal structure, Crystals, Oxides, Microwave frequency, Radiofrequency, Synthesis, Temperature, Dielectric properties, Magnetic properties, Magnetic materials, Magnetism, Ferromagnetism, Measurement, Ferrites, Barium compounds, Cobalt compounds, Resonance absorption.

Progress is reported on the investigation of the properties of hexagonal ferromagnetic materials having a preferred plane, or direction, or magnetization. The areas of work include the following: (1) synthesis investigation of the parameters influencing crystal structure, anisotropy, and high frequency magnetic properties, (2) static characteristics of magnetization and anisotropy, (3) high frequency evaluation of initial micron and dielectric constant at 250 to 1000 mc, and temperature characteristics at 2.0 mc, and (4) microwave evaluation of anisotropy field, resonance absorption, and line width at 10.3, 13.7, and 15.1 kmc. (Author) (See also PB-154 478)

AD-265 266 $13.00

Electron Device Lab., Ohio State U. Research Foundation, Columbus.
ELECTRICAL PROPERTIES OF HIGH-PURITY BORON, by W. J. Taylor, Rama Chintakindi and others. Final rept. on Contract AF 49(638)424. July 61, 182p. 94 refs. RF Proj. 829; AFOSR-1177.

DESCRIPTORS: *Boron, Purification, Crystal structure, Electrical properties, Hall effect, Thermoelectricity, Optics, Photoconductivity, *Semiconductors, X-ray diffraction analysis, Atomic structure, Lattices, Energy, Nuclear states, Preparation, Boron compounds, Chlorides, Pyrolysis, Zone melting, Electron beams, Induction heating.

An extensive and critical review is given of the existing data on the crystalline forms and structure, and the electrical and optical properties of elemental boron. Structures discussed include the stable α - and β - rhombohedral boron and the two tetragonal polymorphs which are probably monotropic. Longuet-Higgins' theory of bonding in elemental boron is reviewed, and the effect of crystal field splitting in modifying his conclusions is discussed. (Author)

TID-17182 $4.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
ELECTRON MICROGRAPHIC BOMBARDMENT STUDIES OF ALPHA-LEAD AZIDE, by Melvin A. Cook, N. Lawrence and others. 1962, 45p. 10 refs.

UCRL-9802 $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
THE CRYSTAL STRUCTURE OF COBALT SULFATE HEXAHYDRATE, by Allan Zalkin, Helena Ruben, and David H. Templeton. Rept. on Contract W7405-eng-48. Aug 61, 21p. 13 refs.

UCRL-10490 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
EFFECT OF TEMPERATURE ON THE PLASTICITY OF POLYCRYSTALLINE LITHIUM FLUORIDE, by D. W. Budworth and Joseph A. Pask. Rept. on Contract W7405-eng-48. 8 Oct 62, 13p. 9 refs.

PB 162 737 $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MAGNETOPLASMA EFFECTS IN SOLIDS, by Benjamin Lax. Rept. on Contract AF 19(604)5200. 27 Apr 60, 30p. 15 refs. Rept. no. 8G-0007; AD-236 324.

DESCRIPTORS: *Solids, *Plasma physics, *Electromagnetic properties, Ionosphere, Refractive index, Magnetic fields, Cyclotrons, Electromagnetic waves, Electrons, Resonance absorption, Frequency, *Semiconductors.

The electromagnetic properties of plasmas in ionized gases were considered from the phenomenological classical magneto-ionic theory in the linear limit for two sets of particles, i.e., electrons and ions. In addition, due to the nature of crystalline solids, these effects are further enriched by added complexities associated with the symmetry and band structure of the crystals. Still other differences arise from the dielectric properties and the greater electron densities possible. The latter may vary, for practical purposes, in a semiconductor from 10^6/cc to 10^{22}/cc for metals. Thus in actuality, plasma effects in solids were observed from microwave frequencies well into the vacuum ultraviolet. (Author)

TID-13975 $2.60

Los Alamos Scientific Lab., N. Mex.
CRYSTAL STRUCTURE OF $Li_2SO_4 H_2O$, A THREE DIMENSIONAL REFINEMENT, by Allen C. Larson. Rept. on Contract W7405-eng-36. 10 Oct 61, 21p. 10 refs. LADC-4883.

TID-14681 $1.60

Savannah River Lab., Aiken, S. C.
QUANTITATIVE INTERPRETATION OF PREFERRED ORIENTATION MEASUREMENTS, by E. F. Sturcken and J. W. Croach. Rept. on Contract AT(07-2)1. 1962, 19p. 13 refs.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 162 629 $3.60

Battelle Memorial Inst. [Columbus, Ohio.]
AN ELECTRONIC SCANNER FOR PHOTOGRAPHIC PLATES, by D. T. Williams. Rept. for 13 Jan 48-31 July 50, on Contract NObs-50352. 1 Aug 50, 36p. Rept. no. BMI-T-33.

DESCRIPTORS: *Photographic plates, Scanning, *Electronic scanners, Electronic equipment.

A scanner has been set up, and some experiments have been made in scanning of photographic plates by electronic means. The aim is to locate proton recoil tracks from neutron bombardment for later analysis when there are as few as 500 recoils per square centimeter of plate. The scanning table, microscope mount, and primary electronic-detecting equipment have been made and tested. The feasibility of the device appears to have been established by these experiments. A number of uses for a device of this kind might be mentioned. It could be used in analyses of weak-neutron sources. It would be convenient in observing γ spectra when deuterium-impregnated plates are used.

PB 162 651 $10.10

Research Lab. of Electronics, Mass. Inst. of Tech. [Cambridge].
A LEFT-TO-RIGHT GENERATIVE GRAMMAR OF FRENCH, by David Allen Dinneen. Dec 62, 130p. 24 refs.

DESCRIPTORS: *Language, *Programming (Computers), Programming languages, Machine translation.

The grammar of French described in the following chapters differs from most other grammars of French in that it synthesizes, rather than analyzes, French sentences. By a series of operations, which are described by the rules of the grammar, the final constituents (words) of a sentence are developed from higher level syntactic constituents, which were in turn developed from constituents at still higher levels in the syntactic hierarchy, and so on up to the highest level, "SENTENCE". This type of grammar is called a generative grammar, since it is designed to generate sentences in the language being described. The process by which an upper level syntactic unit produces two (or more) lower level units which are the immediate constituents of this higher unit, is called expansion.

Communication Theory

PB 158 551 $10.10

Electronics Research Lab., Northeastern U. [Boston, Mass.]
TABLE OF CAPACITY AND SYMBOL-PROBABILITIES OF A COMPLETE ERASURE CHANNEL, by Raimundas Sukys. Supplement to final rept. on Contract AF 19(604)3053. 31 May 61, 121p. 3 refs. AFCRL 364, Supplement.

DESCRIPTORS: *Communications theory, *Digital systems, Digital computers, Probability, *Tables, *Information theory, Detectors, Coding, Multipath transmission, Mathematical analysis, Statistical analysis.

A procedure is developed for the use of Muroga's method to evaluate numerically for a complete erasure channel (1) the channel capacity, and (2) the input and output symbol probabilities required to achieve channel capacity. A table is presented showing these quantities at intervals of the probabilities of correct recognition, α and β, of 0.01. These results are also displayed graphically. (Author) (See also AD-264 765)

AD-279 341 $1.60

Ohio State U. Research Foundation, Columbus.
ORTHOGRAPHIC REPRESENTATIONS OF THE ENGLISH PRONUNCIATION AS AN AID IN TEACHING ILA. SUPPLEMENT NO. 1, by Henry M. Moser, Herbert J. Oyer, and Wallace C. Fotheringham. Rept. on Contract AF 19(604)4575. 1959, 15p. AFCRC TN 59-75, Supplement no. 1.

DESCRIPTORS: Aeronautics, Language, *Speech, *Air traffic control systems, *Vocabulary, Intelligibility.

To the nine languages included in the original report, the present list adds a Greek orthographic spelling of air traffic control words and phrases. This list has not as yet been subjected to the experimental evaluation performed on behalf of the original nine orthographic spellings. (Author) (See also PB 150 248)

SOCIAL SCIENCES

PB 162 733 $4.60

Army [Electronics] Materiel Support Agency, Fort Monmouth, N. J.
WRITING GUIDE: MODIFICATION WORK ORDERS. 20 Apr 62, 44p. Rept. no. SIG 730-3, supersedes rept. dated 31 Oct 59.

DESCRIPTORS: Army, Maintenance personnel, *Job analysis, Preparation, Standards, *Military publications.

This writing guide gives detailed instructions for preparing Department of the Army modification work order (MWO) manuscripts. It prescribes the style and format to be used and contains instructions regarding the security classification, the numbering system, changes to the basic MWO, and the supersession and rescission of MWO's. (Author)

AD-270 594 $2.60

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
INDUCTIVE METHODS IN SEMANTIC ANALYSIS, by Paul L. Garvin. Technical note no. 1 on A Study of Inductive Method in Syntax, Contract AF 49(638)1128. 22 Jan 62, 29p. 12 refs. AFOSR-1976.

DESCRIPTORS: *Language, *Vocabulary, Analysis, *Reasoning, Verbal behavior

This paper constitutes an attempt to render explicit the procedure followed intuitively in the conduct of the syntactic analysis of a little-known language. It is assumed that the detailed explication of the analyst's intuitive research decisions will ultimately give a precise and reliable understanding of the process of analysis, thus leading to the formulation of an inductive research methodology for syntax. (Author)

A D INDEX

AD No.	Div.
291 904	20
291 905	16
291 906	22
291 907	25
291 908	19
291 909	20
291 910	16
291 911	16
291 912	14
291 917	14
291 918	25
291 924	25
291 925	2
291 926	2
291 927	20
291 930	8
291 931	2
291 948	1
291 949	16
291 951	28
291 954	15
291 956	8
291 957	22
291 958	6
291 961	2
291 962	9
291 965	32
291 971	4
291 972	8
291 973	14
291 974	22
291 982	6
291 984	14
291 990	5
291 994	14
291 995	17
291 999	5
292 001	25
292 005	17
292 011	25
292 016	9
292 018	9
292 029	17
292 035	25
292 036	2
292 045	2
292 047	9
292 048	6
292 050	14
292 061	17
292 062	17
292 063	15
292 064	7
292 065	8
292 067	30
292 068	16
292 071	8
292 072	1
292 073	20
292 074	16
292 075	8
292 077	16
292 078	20
292 081	25
292 083	22
292 086	30
292 088	25
292 089	2
292 090	2
292 092	22
292 093	1
292 094	5
292 095	14
292 097	5
292 098	4
292 105	28
292 106	15
292 108	25
292 109	30
292 110	22
292 113	6
292 114	25
292 115	2
292 116	6
292 118	25
292 119	5
292 120	28
292 122	14
292 123	16
292 124	6
292 125	15
292 127	8
292 129	8
292 131	8
292 133	25
292 134	7
292 135	8
292 136	30
292 139	7
292 141	8
292 142	6
292 143	7
292 144	28
292 145	2
292 149	31
292 150	8
292 152	14
292 153	28
292 155	30
292 156	2
292 158	2
292 159	2
292 160	2
292 161	8
292 164	24
292 166	25
292 167	2
292 168	30
292 169	32
292 170	32
292 172	30
292 176	5
292 177	9
292 178	25
292 179	9
292 180	25
292 181	28
292 182	25
292 183	13
292 185	25
292 186	17
292 187	8
292 189	9
292 190	10
292 191	15
292 193	19
292 194	12
292 195	5
292 196	2
292 197	9
292 198	12
292 199	7
292 200	17
292 201	8
292 202	14
292 203	7
292 204	30
292 205	16
292 206	27
292 207	28
292 209	25
292 210	27
292 211	17
292 212	17
292 213	16
292 214	10
292 215	28
292 216	4
292 217	20
292 218	25
292 219	8
292 220	7
292 221	30
292 222	19
292 223	17
292 224	1
292 225	9
292 226	7
292 227	16
292 229	1
292 230	2
292 231	8
292 232	16
292 233	26
292 234	14
292 235	25
292 236	25
292 237	8
292 238	10
292 239	17
292 240	17
292 243	2
292 244	17
292 245	12
292 246	4
292 248	4
292 249	4
292 250	17
292 251	32
292 252	7
292 254	2
292 255	30
292 256	14
292 257	27
292 258	27
292 259	17
292 261	16
292 262	14
292 263	16
292 265	25
292 266	25
292 267	16
292 269	17
292 270	17
292 271	17
292 272	7
292 273	7
292 275	7
292 276	14
292 277	14
292 278	14
292 279	14
292 280	17
292 281	20
292 282	14
292 283	17
292 284	17
292 285	14
292 286	14
292 287	14
292 288	14
292 289	14
292 290	17
292 291	14
292 292	14
292 293	14
292 294	17
292 295	26
292 296	14
292 297	14
292 298	14
292 299	7
292 300	9
292 302	6
292 305	16
292 307	1
292 308	9
292 309	25
292 310	22
292 312	9
292 313	17
292 314	8
292 317	30
292 320	11
292 321	8
292 322	14
292 324	25
292 326	14
292 329	8
292 331	28
292 332	13
292 333	9
292 334	20
292 335	9
292 336	9
292 337	9
292 338	25
292 339	16
292 340	9
292 341	30
292 343	9
292 346	8
292 347	16
292 600	1
292 601	9
292 602	8
292 603	17
292 605	18
292 606	20
292 607	8
292 608	1
292 609	15
292 610	16
292 611	8
292 612	17
292 613	30
292 615	1
292 616	4
292 617	17
292 618	4
292 619	25
292 620	12
292 621	30
292 623	25
292 626	20
292 627	4
292 628	12
292 629	13
292 631	7
292 635	17
292 637	16
292 638	15
292 641	8
292 642	16
292 643	2
292 644	28
292 649	2
292 652	30
292 653	17
292 654	9
292 655	26
292 657	25
292 658	9
292 659	30
292 660	30
292 661	25
292 662	17
292 663	4
292 664	9
292 665	25
292 670	15
292 671	15
292 672	1
292 674	9
292 676	12
292 677	15
292 678	30
292 679	16
292 680	2
292 687	25

AD No.	Div.
292 688	15
292 689	14
292 690	16
292 691	15
292 695	30
292 697	30
292 698	15
292 699	2
292 700	17
292 702	25
292 703	17
292 704	16
292 705	23
292 706	30
292 709	25
292 710	28
292 711	32
292 713	16
292 714	25
292 716	25
292 725	2
292 729	12
292 730	8
292 733	15
292 736	28
292 741	2
292 749	12
292 750	32
292 752	15
292 753	15
292 761	1
292 762	28
292 763	2
292 767	2
292 770	27
292 792	16
292 794	8
292 795	28
292 796	30
292 797	25
292 798	17
292 799	16
292 900	32
292 901	9
292 902	17
292 903	28
292 904	15
292 905	25
292 906	9
292 908	16
292 909	23
292 910	8
292 911	25
292 912	15
292 913	2
292 914	15
292 915	15
292 916	15
292 917	15
292 918	15
292 920	16
292 921	28
292 922	4
292 923	22
292 924	25
292 926	16
292 927	22
292 929	14
292 930	13
292 931	4
292 932	7
292 934	2
292 935	2
292 936	6
292 937	9
292 938	27
292 939	25
292 940	12
292 941	2
292 942	16
292 944	30
292 945	16
292 946	16
292 947	16
292 948	12
292 951	23
292 952	8
292 954	24
292 955	30
292 957	1
292 958	9
292 959	2
292 960	23
292 961	25
292 963	20
292 965	9
292 966	5
292 967	9
292 968	15
292 969	6
292 971	2
292 972	16
292 974	29
292 975	30
292 976	17
292 977	9
292 978	25
292 980	15
292 989	8
292 990	8
292 991	8
292 992	8
292 993	14
292 994	20
292 995	12
292 996	11
292 997	15
292 999	16
293 094	8
293 096	17
293 097	17
293 098	17
293 099	26
293 100	17
293 101	16
293 102	22
293 103	8
293 105	17
293 106	30
293 107	32
293 124	33
293 125	16
293 126	22
293 131	29
293 132	16
293 133	16
293 134	16
293 135	16
293 136	16
293 145	8
293 146	8
293 147	18
293 149	8
293 150	16
293 152	12
293 153	8
293 154	16
293 155	30
293 158	17
293 159	29
293 160	14
293 161	22
293 163	9
293 168	2
293 169	16
293 170	28
293 171	29
293 172	16
293 173	16
293 174	16
293 175	16
293 176	16
293 177	16
293 178	16
293 179	16
293 180	16
293 181	16
293 182	16
293 183	16
293 184	16
293 185	16
293 187	16
293 188	16
293 189	16
293 190	16
293 191	28
293 194	16
293 195	2
293 197	8
293 199	22
293 200	7
293 206	3
293 207	16
293 208	30
293 210	30
293 211	15
293 212	15
293 213	16
293 214	16
293 215	15
293 216	8
293 219	14
293 220	4
293 222	28
293 223	5
293 224	26
293 226	16
293 232	17
293 234	14
293 236	1
293 238	16
293 239	23
293 240	25
293 241	30
293 242	15
293 243	30
293 244	15
293 245	15
293 246	32
293 247	32
293 248	25
293 249	16
293 250	2
293 251	32
293 252	32
293 256	17
293 259	17
293 261	8
293 264	28
293 265	4
293 266	25
293 268	25
293 269	3
293 270	17
293 271	8
293 272	14
293 273	9
293 274	29
293 275	26
293 276	8
293 280	25
293 287	27
293 289	16
293 290	8
293 291	25
293 292	22
293 293	30
293 401	25
293 402	14
293 403	10
293 404	16
293 405	14
293 408	7
293 409	16
293 410	17
293 411	25
293 412	14
293 413	1
293 415	16
293 416	5
293 420	25
293 421	2
293 422	27
293 423	33
293 424	32
293 425	7
293 426	25
293 427	2
293 428	2
293 430	8
293 431	18
293 432	25
293 433	7
293 435	9
293 436	4
293 437	14
293 438	25
293 440	25
293 441	20
293 442	30
293 444	30
293 445	25
293 446	4
293 447	8
293 448	9
293 449	30
293 450	2
293 451	2
293 452	5
293 453	7
293 455	16
293 456	15
293 457	22
293 460	8
293 462	6
293 463	4
293 466	4
293 468	8
293 469	6
293 470	2
293 471	17
293 476	22
293 478	8
293 481	16
293 482	6
293 483	6
293 486	14
293 487	14
293 488	14
293 489	30
293 490	7
293 494	22
293 495	12
293 603	2
293 604	2
293 605	2
293 607	2
293 608	12
293 612	8
293 613	30
293 614	16
293 620	22
293 627	12
293 628	1
293 629	8
293 631	22
293 649	20
293 651	9
293 671	18
293 673	2
293 674	15
293 675	15
293 676	15
293 677	15
293 678	15
293 679	15
293 681	10
293 682	32
293 691	31
293 692	26
293 695	30
293 698	22
293 699	20

NUMBER INDEX

Number	Page
ACIC TR-86	S-6
AD-18 468	S-18
AD-45 268	S-40
AD-118 271	S-20
AD-141 174	S-23
AD-141 320	S-23
AD-207 228	S-21
AD-217 161	S-39
AD-218 650	S-11
AD-220 350	S-16
AD-225 153	S-25
AD-226 041	S-13
AD-227 708 see PB 162 670	S-40
AD-228 195	S-16
AD-228 768	S-13
AD-229 510	S-40
AD-230 081	S-12
AD-234 507	S-12
AD-234 750	S-16
AD-236 324	S-23
AD-240 344	S-25
AD-240 888	S-12
AD-242 564	S-12
AD-248 626	S-7
AD-248 728	S-40
AD-250 188	S-14
AD-250 743	S-17
AD-252 562	S-13
AD-253 823	S-14
AD-262 724	S-42
AD-264 380	S-21
AD-264 765, suppl.	S-43
AD-264 875	S-27
AD-264 884	S-26
AD-265 266	S-42
AD-267 058	S-9
AD-268 432	S-22
AD-268 829	S-3
AD-269 127	S-19
AD-270 241	S-8
AD-270 594	S-44
AD-271 380	S-9
AD-272 569	S-15
AD-273 324	S-21
AD-273 339	S-41
AD-274 757	S-18
AD-275 914	S-27
AD-276 250	S-14
AD-276 892	S-1
AD-279 341	S-44
AD-280 718	S-40
AD-282 632	S-18
AD-285 020	S-1
AD-286 455 repriced	S-41
AERDL-1545-TR	S-21
AFCRC-TN-59-75, suppl. 1	S-44
AFCRL-364, suppl.	S-43
AFCRL-1010	S-3
AFCRL-62-807	S-1
AFOSR-490	S-27
AFOSR-1051	S-26
AFOSR-1177	S-42
AFOSR-1488	S-19
AFOSR-2259	S-41
AFOSR-2298	S-18
AFOSR-TR-59-125	S-40
AGN-TM-391-II	S-33
ANL-6314	S-34
ANL-6431	S-29
ANL-6551	S-38
ANL-6582	S-34
ANL-6592	S-42
ANL-6608	S-34
ANL-6614	S-34
ANL-6617	S-34
ANL-6624	S-1
ANL-6635	S-34
ANL-FGF-381	S-30
APEX-913	S-35
ARF-5112-12	S-8
ARF-5112-15	S-9
ARF-5112-18	S-9
ARL-246	S-40
ATI-31 218	S-42
ATI-86 758	S-42
ATI-140 077	S-25
BAR-PL-60-10	S-25
BMI-1583(Del.)	S-35
BMI-1596(Del.)	S-35
BMI-1597	S-35
BMI-1598	S-35
BMI-1602	S-35
BMI-T-33	S-43
BNL-731(S-61)	S-35
BNL-5454	S-32
BNL-5458	S-31
BNL-5521	S-5
BNL-5554	S-7
BNL-5574	S-5
BNL-5628	S-7
BNL-5974	S-32
BNL-6000	S-7
BNL-6001	S-32
BNL-6305	S-31
BNL-6308	S-35
BNL-6309	S-31
BNL-6334	S-32
BNL-6338	S-29
BNL-6339	S-4
BNL-6342	S-1
BNL-6355	S-25
BNL-6362	S-1
BNL-6407	S-31
BRB-54	S-35
BRB-64	S-35
Brush-398	S-42
CBI Ref-62-20	S-7
CBI TR-30	S-7
CEND-152	S-35
D-J-62-5	S-29
DASA-1271	S-1
DP-370	S-8
DP-694	S-38
DP-734	S-33
DP-740	S-32
DP-749	S-5
DP-750	S-5
DP-766	S-5
DP-775	S-35
DP-778	S-38
DP-780	S-33
DP-783	S-21
DP-787	S-37
DPSPU-62-30-21B	S-40
DPSPU-62-30-38	S-38
DTMB-933, rev.	S-28
DTMB-1461	S-28
GA-2963	S-35
GA-3588	S-35
GAT-T-970	S-5
GAT-Z-4115	S-29
GEAP-3909	S-26
GEMP-16A	S-26
GMI-2277	S-6
Grant NSF G-9330	S-40
GRD AFSG-149	S-1
HASL-124	S-37
HAVENS-141	S-35
HSER-2215	S-14
HSER-2224	S-14
HW-48861 TH	S-36
HW-63501	S-27
HW-68420(rev.)	S-36
HW-69200(pt. I)	S-36
HW-69561(rev.) (Del.)	S-20
HW-70050	S-31
HW-71051	S-33
HW-71251	S-37
HW-71521	S-36
HW-72802	S-37
HW-73318	S-29
HW-73859(rev.)	S-36
HW-74190	S-31
HW-74287	S-36
HW-74333	S-36
HW-74339	S-29
HW-74398	S-39
HW-74429	S-36
HW-74802	S-29
HW-75125	S-29
HW-75147	S-31
HW-75290	S-39
HW-SA-2169	S-7
HW-SA-2175	S-7
HW-SA-2319	S-4
HW-SA-2629	S-36
HW-SA-2680	S-36
HW-SA-2689	S-36
HW-SA-2700	S-4
HW-SA-2711	S-37
HW-SA-2748	S-39
HW-SA-2750	S-36
HW-SA-2755	S-4
HW-SA-2757	S-36
HW-SA-2778	S-36
HW-SA-2783	S-37
HW-SA-2787	S-8
HW-SA-2801	S-36
HW-SA-2805	S-29
IDO-14569	S-8
IDO-14581	S-39
IDO-14586	S-39
IDO-14587	S-39
IDO-14591	S-5
IDO-14592	S-39
IDO-14593	S-8
IDO-16689	S-37
IDO-16794	S-39
IDO-16799	S-37
IDO-16801	S-37
IDO-16805	S-37
IDO-16806	S-38
IS-420	S-34
IS-500	S-4
JPL BIB-39-2	S-21
JPL TR-32-116	S-21
JPL TR-32-176	S-22
K-1531	S-29
K-1536	S-32
KAPL-2000-19	S-37
KAPL-2214	S-31
KAPL-2220	S-31
KAPL-2221	S-29
KT-530	S-39
LADC-4369(rev. 2)	S-6
LADC-4883	S-43
LADC-4981	S-1
LADC-5216	S-41
LADC-5354	S-37
LADC-5365	S-30
LADC-5408	S-37
LADC-5427	S-4
LADC-5445	S-40
LADC-5446	S-4
LADC-5447	S-33
LADC-5449(rev.)	S-6
LADC-5459	S-40
LADC-5471	S-30
LADC-5501	S-31
LADC-5524	S-33
LADC-5539	S-27
LAMS-2755	S-37
LAMS-2760	S-7
LAMS-2762	S-6
LAMS-2770	S-27
LAMS-2773	S-30
LF-1	S-33
LF-2	S-1
LF-3	S-3
LL-8G-0007	S-23
LLP(HU) TR-2-9	S-39
MLNYNS-5332, 15, pt. 2, PR-1	S-17
MSEE-54-48	S-17
MURA-644	S-17
MURA-649	S-33
NAA-SR-6403	S-34
NAA-SR-6405	S-8
NAA-SR-7036	S-9
NAA-SR-7650	S-38
NASA N62-10350	S-21
NASA N62-10522	S-41
NASA N62-11365	S-27
NASA N62-12204	S-27
NASA N62-14715	S-19
NASA N62-15[illegible]52	S-1
NASA N62-17[illegible]41	S-26
NASA N62-17443	S-37
NASA N62-17463	S-33
NASA N62-17477	S-37
NASA N62-17548	S-29
NASA N62-17555	S-9
NASA N62-17562	S-30
NASA N62-17620	S-1
NASA N62-17970	S-32
NASA N62-17971	S-37
NASA N62-17974	S-29
NASA N62-17975	S-21
NASA N62-18029	S-33
NASA N62-18030	S-29
NASA N63-10070	S-17
NASA N63-10141	S-38
NASA N63-10157	S-35
NASA N63-10258	S-19
NASA N63-10290	S-21
NASA N63-10357	S-29
NASA N63-10360	S-31
NASA N63-10465	S-27
NASA N63-10547	S-3
NASA N63-10566	S-29
NASA N63-10740	S-23
NASA N63-10747	S-35
NASA N63-10864	S-6
NASA N63-11616	S-26
NASA N63-11617	S-27
NASA N63-11740	S-40
NASA N63-11741	S-19
NASA N63-11742	S-6
NASA TN-D-1083	S-40
NASA TN-D-1533	S-26
NASA TN-D-1543	S-19
NASA TN-D-1557	S-27
NASA TN-D-1567	S-6
NAVWEPS-1171	S-28
NAVWEPS-1292	S-28
NCEL M-046	S-8
NCEL R-197	S-22
NLCO-856	S-33
NLCO-859	S-5
NLCO-860	S-37
NMI-2107	S-30
NOL ARR-151	S-27
NOLTR-61-28	S-27
NOLTR-61-68	S-27
NOLTR-62-142	S-41
NOTS-227	S-28
NOTS-362	S-28
NUMEC-P-48	S-37
NYO-4817 & NYO-4818	S-20
NYO-8101	S-7
NYO-9659	S-32
NYO-9803	S-6
NYO-10470	S-7
ORNL-3293	S-6
ORNL-3328	S-3
ORNL-TM-166	S-27
ORNL-TM-218	S-37
ORNL-TM-417	S-30
ORO-580	S-3
OSURF-829-FR	S-42
PA ME-5-59	S-25
PB 144 732 see PB 162 670	S-40
PB 150 248, suppl.	S-44
PB 158 536 see AD-264 884	S-26
PB 158 551	S-43
PB 158 683 see AD-264 875	S-27
PB 158 796 see AD-265 266	S-42
PB 159 216 see AD-268 829	S-3
PB 162 438	S-17
PB 162 558	S-14
PB 162 559	S-15
PB 162 604	S-20
PB 162 621	S-40
PB 162 622	S-17
PB 162 623	S-13
PB 162 624	S-13
PB 162 625	S-7
PB 162 626	S-11
PB 162 627	S-21
PB 162 628	S-17
PB 162 629	S-43
PB 162 630	S-12
PB 162 631	S-12
PB 162 632	S-12
PB 162 633	S-12
PB 162 634	S-13
PB 162 636	S-10
PB 162 637	S-9
PB 162 638	S-10
PB 162 639	S-10
PB 162 640	S-10
PB 162 641	S-10
PB 162 643	S-19
PB 162 644	S-39
PB 162 645	S-40
PB 162 646	S-18
PB 162 648	S-42
PB 162 649	S-41
PB 162 650	S-22
PB 162 651	S-43

Number	Page
PB 162 652	S-29
PB 162 664	S-20
PB 162 667 see AD-282 632	S-18
PB 162 668	S-2
PB 162 669	S-12
PB 162 670	S-40
PB 162 671	S-11
PB 162 672 see AD-267 068	S-9
PB 162 673 see AD-271 380	S-9
PB 162 674	S-17
PB 162 675	S-8
PB 162 676	S-9
PB 162 677	S-9
PB 162 678	S-19
PB 162 679 see AD-264 380	S-21
PB 162 680	S-8
PB 162 681	S-21
PB 162 682	S-20
PB 162 683	S-22
PB 162 684	S-14
PB 162 685	S-14
PB 162 686	S-15
PB 162 687	S-15
PB 162 688	S-16
PB 162 689	S-16
PB 162 690	S-16
PB 162 691	S-16
PB 162 692	S-25
PB 162 693	S-10
PB 162 694	S-11
PB 162 695	S-11
PB 162 696	S-25
PB 162 697	S-26
PB 162 698	S-26
PB 162 699	S-25
PB 162 702	S-7
PB 162 703	S-19
PB 162 731	S-42
PB 162 732	S-6
PB 162 733	S-44
PB 162 734	S-27
PB 162 736	S-21
PB 162 737	S-43
PB 162 738	S-18
PB 162 739	S-28
PB 162 740	S-28
PB 162 741	S-28
PB 162 742	S-28
PB 162 743	S-22
PB 162 744	S-23
PB 162 745	S-23
PB 162 746	S-23
PB 162 747	S-23
PB 162 748	S-24
PB 162 749	S-24
PB 162 750	S-24
PB 162 751	S-24
PB 162 752	S-25
PB 171 809-4	S-19
PB 181 085 superseded	S-7
PB 181 086 superseded	S-19
PPAD-454 E	S-33
PPAD-465 D	S-33
PPAD-473 E	S-26
PREDC-759	S-35
PRL(PSU)-2.62	S-26
PRL(PSU)-3.41	S-26
RFP-278	S-33
RFP-279	S-2
RFP-285	S-25
SC-4675(RR)	S-38
SCDC-2895	S-30
SCR-314	S-27
SEL TR-68	S-18
SEL TR-156-7	S-18
SIG-730-3	S-44
SRI-3244, FR	S-7
SRI-3915-3	S-18
SRI-3994-2	S-6
SL/TR-60-0000-09123	S-19
TEI-829	S-39
TEI-832	S-38
TID-6613(suppl. 3)	S-34
TID-7624	S-34
TID-13276	S-40
TID-13814	S-6
TID-13975	S-43
TID-13994	S-1
TID-14021	S-34
TID-14031	S-6
TID-14059	S-31
TID-14065	S-4
TID-14073	S-34
TID-14150	S-27
TID-14168	S-5
TID-14175	S-31
TID-14354	S-29
TID-14681	S-43
TID-14800	S-41
TID-14889	S-34
TID-14891	S-4
TID-14894	S-41
TID-14906	S-5
TID-15452	S-26
TID-15459	S-11
TID-15749	S-32
TID-16592	S-6
TID-16860	S-32
TID-16867	S-32
TID-16949	S-38
TID-16973	S-6
TID-16980	S-30
TID-17000	S-4
TID-17001	S-4
TID-17002	S-4
TID-17003	S-4
TID-17015	S-2
TID-17016	S-2
TID-17030	S-5
TID-17033	S-5
TID-17045	S-1
TID-17046	S-32
TID-17048	S-2
TID-17075	S-2
TID-17077	S-2
TID-17082	S-1
TID-17168	S-31
TID-17169	S-3
TID-17170	S-4
TID-17171	S-3
TID-17182	S-43
TID-17185	S-42
TID-17186	S-33
TID-17188	S-41
TID-17191	S-3
TID-17192	S-6
TID-17195	S-34
TID-17196	S-34
TID-17197	S-31
TID-17198	S-3
TID-17199	S-34
TID-17200	S-3
TID-17201	S-3
TID-17204	S-3
TID-17211	S-31
TID-17213	S-41
TID-17219	S-32
TID-17227	S-25
TID-17231	S-38
TID-17244	S-2
TID-17250	S-31
TID-17254	S-9
TID-17264	S-36
TID-17265	S-36
TID-17276	S-30
TID-17287	S-2
TID-17342	S-7
UAC-5200	S-40
UAC-5515	S-4
UAC-5532	S-31
UAC-5551	S-34
UAC-5603	S-31
UAC-5880	S-4
UAC-5896	S-41
UAC-5904	S-34
UAC-5905	S-5
UAC-6706	S-34
UAC-6711	S-34
UAC-6749	S-31
UAC-6787	S-41
UAC-6810, pt. 2	S-31
UAC-6814	S-30
UAC-6821	S-34
UCRL-5947-T	S-32
UCRL-6400	S-28
UCRL-6431	S-30
UCRL-6530	S-30
UCRL-6547	S-14
UCRL-6690	S-38
UCRL-6691	S-22
UCRL-6696-T	S-30
UCRL-6919	S-28
UCRL-6980	S-37
UCRL-7035	S-21
UCRL-9647	S-30
UCRL-9699	S-5
UCRL-9705	S-4
UCRL-9726	S-41
UCRL-9774	S-32
UCRL-9787	S-8
UCRL-9791	S-33
UCRL-9792	S-40
UCRL-9802	S-43
UCRL-9805	S-2
UCRL-9808	S-30
UCRL-9828	S-30
UCRL-9875(vol. 1)	S-32
UCRL-9885	S-30
UCRL-9887	S-5
UCRL-10187	S-38
UCRL-10275	S-33
UCRL-10294	S-38
UCRL-10439	S-33
UCRL-10440	S-32
UCRL-10457	S-29
UCRL-10490	S-43
UCRL-10521	S-2
UCRL-13004	S-7
UR-618	S-4
URM-47 (Impulse generator)	S-17
USBM-U-978	S-29
USNER-143	S-11
UTIA TN-48	S-19
WADC-TN-57-175	S-20
WAPD-T-1280	S-39
WAPD-T-1531	S-26
WASH-1039	S-38
WCAP-1373	S-38
WRL-808-D801-P1	S-6
WT-1475	S-20
Y-1396	S-38
Y-1405	S-21

SUBJECT INDEX

Subject	Page	PB Number
Absorption	S-41	AD-286 455
Absorption spectra	S-41	PB 162 649
Acceleration tolerance	S-1	AD-276 892
Aerodynamic configurations	S-28	PB 162 739
		PB 162 740
Aerodynamics	S-21	PB 162 627
Ailerons	S-28	PB 162 740
Air drop operations	S-8	AD-270 241
Air traffic control systems	S-44	AD-279 341
Alfven waves	S-40	PB 162 645
Algae	S-3	AD-268 829
Aluminum	S-22	PB 162 743
	S-23	PB 162 744
		PB 162 745
		PB 162 746
		PB 162 747
	S-24	PB 162 749
		PB 162 750
		PB 162 751
	S-25	PB 162 752
AN/PRC-34	S-17	PB 162 674
AN/PRC-51	S-17	PB 162 674
AN/PRM-1	S-17	PB 162 628
AN/URM-6	S-17	PB 162 628
Angle of attack	S-28	PB 162 739
Animals	S-2	PB 162 668
Antimony	S-39	PB 162 644
Aspect ratio	S-28	PB 162 740
Band-pass filters	S-19	PB 162 678
Barium compounds	S-11	PB 162 694
		PB 162 695
	S-14	AD-276 250
		PB 162 558
	S-15	AD-272 569
		PB 162 559
		PB 162 686
		PB 162 687
	S-16	PB 162 689
		PB 162 690
Bibliography	S-2	PB 162 668
	S-40	PB 162 621
Binders	S-21	PB 162 681
Birds	S-2	PB 162 668
Bituminous coatings	S-22	PB 162 683
Blast	S-1	AD-276 892
	S-20	PB 162 682
Blowers	S-7	PB 162 625
Boron	S-42	AD-265 266
Boundary layer	S-27	AD-275 914
Buildings	S-20	PB 162 682
Calcium compounds	S-16	PB 162 688
Carbon brushes	S-17	PB 162 438
Cargo	S-7	PB 162 702
	S-19	PB 162 703
Cathode ray tube screens	S-25	PB 162 692
Cathode ray tubes	S-13	PB 162 623
		PB 162 624
Celestial mechanics	S-1	AD-285 020
Ceramic capacitors	S-10	PB 162 693
	S-11	PB 162 694
		PB 162 695
	S-12	PB 162 669
	S-14	AD-276 250
		PB 162 558
	S-15	AD-272 569
		PB 162 559
		PB 162 686
		PB 162 687
	S-16	PB 162 688
		PB 162 689
		PB 162 690
		PB 162 691
Ceramic coatings	S-25	PB 162 699
Ceramic materials	S-14	AD-276 250
		PB 162 558
	S-15	AD-272 569
		PB 162 559
		PB 162 686
		PB 162 687
	S-16	PB 162 688
		PB 162 689
		PB 162 690
		PB 162 691
Cerenkov radiation	S-9	PB 162 677
Chlorophylls	S-3	AD-268 829
Circuits	S-11	PB 162 671
Coatings	S-22	PB 162 683
Coincidence counting	S-39	PB 162 644
COMIT	S-43	PB 162 651
Communications theory	S-17	PB 162 622
	S-43	PB 158 551
Composite materials	S-22	PB 162 650
		PB 162 743
	S-23	PB 162 744
		PB 162 745
		PB 162 746
		PB 162 747
	S-24	PB 162 748
		PB 162 749
		PB 162 750
		PB 162 751
	S-25	PB 162 752
Composition B (Explosives)	S-19	PB 162 643
Compressible flow	S-27	AD-275 914
Containers	S-7	PB 162 702
	S-19	PB 162 703
Control surfaces	S-28	PB 162 742
Cooling fans	S-7	PB 162 625
Corrosion inhibition	S-22	PB 162 683
Corrosion research	S-25	PB 162 696
Couette flow	S-27	PB 162 734
Cryogenics	S-19	PB 171 809-4
Crystal growth	S-42	PB 162 648
		PB 162 731
Crystal oscillators	S-42	PB 162 731
Crystal structure	S-42	AD-262 724
Cutting tools	S-21	AD-264 380
Data processing systems	S-19	PB 162 678
De-icing materials	S-25	PB 162 696
Delay lines	S-12	PB 162 630
		PB 162 631
		PB 162 632
		PB 162 633
	S-13	PB 162 634
Detonation waves	S-19	PB 162 643
Dielectrics	S-10	PB 162 693
	S-11	PB 162 694
		PB 162 695
	S-14	AD-276 250
		PB 162 558
	S-15	AD-272 569
		PB 162 559
		PB 162 686
		PB 162 687
	S-16	PB 162 688
		PB 162 689
		PB 162 690
		PB 162 691
Differential equations	S-29	PB 162 652
Digital systems	S-9	PB 162 676
	S-43	PB 158 551
Diodes	S-9	AD-267 068
		AD-271 380
Direct current	S-14	PB 162 685
Doppler systems	S-20	PB 162 604
Electric connectors	S-9	PB 162 637
	S-10	PB 162 636
		PB 162 638
		PB 162 639
		PB 162 640
		PB 162 641
	S-18	AD-282 632
Electric motors	S-17	PB 162 438
Electric power production	S-21	PB 162 736
Electric propulsion	S-21	PB 162 627
Electric relays	S-11	PB 162 671
Electromagnetic properties	S-43	PB 162 737
Electromagnetic shielding	S-8	PB 162 680
Electromagnetic waves	S-41	AD-286 455
Electron beams	S-13	PB 162 623
		PB 162 624
Electronic circuits	S-9	AD-267 068
	S-14	PB 162 684
	S-17	PB 162 674
Electronic equipment	S-7	PB 162 625
	S-18	PB 162 738
Electronic scanners	S-43	PB 162 629
Electrons	S-40	AD-280 718
	S-41	AD-273 339
Electrophotography	S-21	PB 162 681
Energy conversion	S-21	PB 162 736
Explosive forming	S-21	AD-264 380
Explosives	S-19	PB 162 643
Ferromagnetic materials	S-42	AD-262 724
Flash discharges	S-40	PB 162 621
Flash lamps	S-40	PB 162 621
Flash radiography	S-19	PB 162 643
Fluid mechanics	S-27	AD-275 914
Fluorescent screens	S-25	PB 162 692
French grammar	S-43	PB 162 651
Fuels	S-26	PB 162 698
Functional analysis	S-17	PB 162 622
Gamma rays	S-20	PB 162 664
	S-39	PB 162 644
Geodetic astronomy	S-6	PB 162 732
Geodetic data	S-6	PB 162 732
Glass textiles	S-22	PB 162 650
		PB 162 743
	S-23	PB 162 744
		PB 162 745
		PB 162 746
		PB 162 747
	S-24	PB 162 748
		PB 162 749
		PB 162 750
		PB 162 751
	S-25	PB 162 752
Greek orthography	S-44	AD-279 341
Guided missiles	S-19	PB 171 809-4
Hall effect	S-9	PB 162 676
		PB 162 677
Heat resistant alloys	S-18	PB 162 738
Heat resistant materials	S-23	PB 162 746
		PB 162 747
	S-24	PB 162 748
		PB 162 750
		PB 162 751
	S-25	PB 162 752
Helium	S-41	AD-273 339
High speed photography	S-40	PB 162 621
Hydraulic fluids	S-26	PB 162 697
		PB 162 698
Hydrodynamics	S-28	PB 162 742
	S-29	PB 162 652
Hypersonic test vehicles	S-25	PB 162 699
ILA	S-44	AD-279 341
Impact shock	S-41	AD-273 339
Information theory	S-43	PB 158 551
Infrared detectors	S-18	AD-274 757
Infrared equipment	S-18	AD-274 757
Infrared spectrophotometers	S-18	AD-274 757
Infrared spectroscopy	S-1	AD-285 020
	S-18	AD-274 757
Injuries	S-1	AD-276 892
Instrumentation	S-9	PB 162 676
		PB 162 677
Job analysis	S-44	PB 162 733
Knudsen number	S-27	PB 162 734
Landing impact	S-8	AD-270 241
Language	S-43	PB 162 651
	S-44	AD-270 594
Lanthanum compounds	S-10	PB 162 693
	S-11	PB 162 694
		PB 162 695
Lead alloys	S-22	PB 162 650
Light	S-41	AD-286 455
Lithography	S-21	PB 162 681
Lubricants	S-17	PB 162 438
	S-26	PB 162 698
Magnetism	S-2	PB 162 668
Magnetohydrodynamics	S-21	PB 162 627
		PB 162 736
	S-40	PB 162 645
		PB 162 670
Manuscripts	S-44	PB 162 733
Maps	S-21	PB 162 681
Masers	S-18	AD-274 757
Material forming	S-21	AD-264 380
Materials	S-20	PB 162 664
Measuring devices (Electrical and electronic)	S-9	PB 162 676
		PB 162 677
	S-17	PB 162 628
	S-18	PB 162 738
Metal coatings	S-22	PB 162 683
	S-25	PB 162 699
Mica capacitors	S-12	PB 162 669
Military equipment	S-8	AD-270 241
Military publications	S-44	PB 162 733
Miniature electrical equipment	S-9	PB 162 637
	S-10	PB 162 636
		PB 162 638
		PB 162 639
		PB 162 640

Subject	Page	Number
Miniature electrical equipment (con.)	S-10	PB 162 641
	S-18	AD-282 632
Miniature electronic equipment	S-12	PB 162 630
		PB 162 632
	S-18	AD-282 632
Modulation	S-9	PB 162 677
Mutations	S-3	AD-268 829
Niobium compounds	S-10	PB 162 693
Noise (Radio)	S-17	PB 162 628
Nuclear energy	S-21	PB 162 736
One-body problem	S-40	AD-280 718
Operators (Mathematics)	S-27	AD-264 875
Optics	S-41	AD-273 339
Packaging	S-7	PB 162 702
	S-19	PB 162 703
Parametric amplifiers	S-9	PB 162 676
		PB 162 677
Partial differential equations	S-27	AD-264 875
Pentolite	S-19	PB 162 643
Phosphors	S-25	PB 162 692
Photographic plates	S-43	PB 162 629
Photosynthesis	S-3	AD-268 829
Piezoelectric crystals	S-42	PB 162 648
		PB 162 731
Pitot tubes	S-27	AD-275 914
Plants	S-2	PB 162 668
	S-3	AD-268 829
Plasma physics	S-40	PB 162 621
		PB 162 645
		PB 162 670
	S-43	PB 162 737
Plastic coatings	S-22	PB 162 683
Plastics	S-8	AD-270 241
	S-22	AD-268 432
Polarization	S-41	AD-273 339
Position finding	S-6	PB 162 732
Powder metallurgy	S-21	AD-264 380
Power supplies	S-14	PB 162 684
		PB 162 685
Probe antenna	S-11	PB 162 626
Programming (Computers)	S-43	PB 162 651
Pulse generators	S-17	PB 162 628
Quantum mechanics	S-40	AD-280 718
Quartz	S-42	PB 162 731
Radar equipment	S-20	PB 162 604
Radar navigation	S-20	PB 162 604
Radiation effects	S-22	AD-268 432
Radioactive isotopes	S-39	PB 162 644
Radioactivity	S-39	PB 162 644
Radiofrequency attenuators	S-18	PB 162 646
Radiofrequency filters	S-12	PB 162 630
		PB 162 631
		PB 162 632
		PB 162 633
	S-13	PB 162 634
RDX	S-19	PB 162 643
Re-entry vehicles	S-19	AD-269 127
Reasoning	S-44	AD-270 594
Refractive index	S-41	AD-286 455
Refractory coatings	S-25	PB 162 699
Refractory materials	S-25	PB 162 699
Reliability (Electronics)	S-12	PB 162 669
Rocket components	S-9	PB 162 637
	S-10	PB 162 636
		PB 162 638
		PB 162 639
		PB 162 640
Rocket propulsion	S-21	PB 162 627
Rockets	S-21	PB 162 627
Rubber coatings	S-22	PB 162 683
Satellite vehicles	S-6	PB 162 732
Scattering	S-41	AD-286 455
Semiconductors	S-9	PB 162 676
		PB 162 677
	S-14	PB 162 558
	S-15	PB 162 686
		PB 162 687
	S-23	PB 162 737
	S-42	AD-265 266
Servo systems	S-17	PB 162 622
Shelters	S-20	PB 162 664
Shielding	S-8	PB 162 680
	S-20	PB 162 664
Ships	S-28	PB 162 742
Silicones	S-17	PB 162 438
Single crystals	S-42	PB 162 648
Sliding contacts	S-18	AD-282 632
Slot antennas	S-11	PB 162 626
Soils	S-20	PB 162 664
Solids	S-43	PB 162 737
Space environmental conditions	S-22	AD-268 432
Speech	S-44	AD-279 341
Stainless steel	S-24	PB 162 751
	S-25	PB 162 752
Statistical analysis	S-26	AD-264 884
Statistical functions	S-26	AD-264 884
Steel	S-8	PB 162 680
Stroboscopes	S-40	PB 162 621
Subminiature electronic equipment	S-17	PB 162 674
Superaerodynamics	S-27	PB 162 734
Supersonic airfoils	S-28	PB 162 739
		PB 162 740
Synthetic stones	S-42	PB 162 648
		PB 162 731
Tables	S-43	PB 158 551
Taylor series	S-29	PB 162 652
Tellurium	S-39	PB 162 644
Terrestrial magnetism	S-2	PB 162 668
Titanium compounds	S-15	PB 162 559
	S-16	PB 162 688
TNT	S-19	PB 162 643
Transformers	S-12	PB 162 630
		PB 162 631
		PB 162 632
		PB 162 633
	S-13	PB 162 634
Transistor amplifiers	S-9	AD-267 068
Transistors	S-9	AD-267 068
		AD-271 380
	S-11	PB 162 671
Traveling wave tubes	S-9	PB 162 677
	S-18	PB 162 646
Vocabulary	S-44	AD-270 594
		AD-279 341
Water vapor	S-41	PB 162 649
Wattmeters	S-9	PB 162 676
Welding	S-21	AD-264 380
Wings	S-28	PB 162 740
Zinc alloys	S-22	PB 162 650